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TEREBENE.

By H. W. Jayne, Ph. D. and G. H. Chase.

Read at the Pharmaceutical Meeting, January 18.

Terebene first appeared in chemical literature in 1840, when Soubeiran and Capitaine (Ann. 34,311), gave this name to a substance obtained by acting on oil of turpentine with gaseous hydrochloric acid. After removing the solid hydrochloride of turpentine, the liquid portion was distilled over lime. This distillate was their so-called terebene. It was a liquid boiling at 135° C. and differing from the original oil of turpentine by being inactive to polarized light.

Deville, in 1841 (Ann. 37,178), described the preparation of this body by the action of concentrated sulphuric acid on oil of turpentine. His terebene was a liquid having a pleasant odor like thyme and the same gravity and boiling point as oil of turpentine.

In 1873, Riban (*Bulletin Soc. Chim.* xx. 100), published the results of an extensive investigation on this subject. According to him the substance obtained by the action of acid on oil of turpentine and heretofore called terebene, was a mixture of true terebene boiling at 155°–156° C. and cymol 174–176° C. He also notes the presence of a camphor among the products of the reaction. This pure terebene had a faint odor and did not solidify at—27° C. When treated with more acid the mixture became hot and a certain amount of terebene was converted into cymol, together with the formation of colophene or diterebene. By continued treatment the terebene was entirely converted into cymol and colophene. This reaction takes place with the evolution of much sulphurous anhydride.

In 1879 an addition to the already copious literature on this subject was made by Armstrong and Tilden (*Berichte* xii, 1752), who thought that terebene was not a chemical compound but a mixture of

several bodies which could be separated by repeated fractional distillation. They found that the greater part distilled between 173° and 180° with, however, a considerable fraction, about 160°. This latter fraction was supposed to be the terebene described by Riban, but instead of remaining liquid at —27° it crystallized in ice, and when carefully fractioned proved to be the inactive solid camphene which small amounts of impurities prevented from crystallizing. The fraction boiling from 170° to 180° was cymol mixed with a hydrocarbon (terpilene) boiling at about 178° and having the same composition as the original oil of turpentine. By using dilute sulphuric acid they found the reaction somewhat different, no camphene was formed, the resulting mixture being mostly composed of terpilene.

The correctness of these views is doubted by Riban, as Armstrong and Tilden did not follow the method of preparation proposed by him. For, while the latter distilled over his terebene in the presence of sulphuric acid, Armstrong and Tilden carefully avoided high heat and removed all traces of acid before distilling. In considering the above it seems quite possible that Armstrong and Tilden had quite a different material under investigation from that described by Riban. For, as the latter justly remarks, while his terebene was a very mobile liquid, their material was a solid body only liquefied by the presence of some trifling impurities, and thus should, he thinks, present the appearance of a more or less viscous oil.

There are numerous substances that can be substituted for sulphuric acid in this reaction on oil of turpentine, notably among these the fluoride of boron, the former, however, is usually employed.

When this acid is dropped into oil of turpentine the mass becomes heated, and if great care is not taken the turpentine boils with evolution of large quantities of sulphurous anhydride. In extreme cases the reaction becomes so intense that the turpentine bursts in flames. When the reaction is completed the acid is separated from the oil and the latter distilled with live steam. In the distillate an oily layer separates which is collected and rectified. A thick greenish residue is left in the still. This consists principally of colophene. An inactive camphor boiling about 200° C. is also present. This body has been shown to be identical with borneol.

As terebene, scientifically considered, seems to offer such a latitude of opinion it is to be supposed that the commercial article bearing this name would vary very much in its composition. For the

purpose of ascertaining the correctness of this assumption we purchased samples from the leading drug houses of this city. We found it popularly believed that the European articles were the purest to be had. We purchased, among others, a very fine looking English preparation, which is recommended by an authority on throat affections, but as our table shows this was one of the poorest in the market.

The following table was prepared after a careful examination of the material for sale by first-class druggists; great care being exercised in each case to obtain the terebene in its original packages so as to insure its authenticity. The rotation in the following is for 10 cm. of liquid and the mean of six readings. The gravities were taken at 14° C.

No.	Origin.	Rotation.	Gravity	155°	160°	165°	170°	175°	180°	185°	190°
1	Turpentine.	14° 11′	0·872	3⅞	84⅞	91⅞	96⅞				
2	"	12° 8′	0·882	15	71	86	87	88			
3	"	11° 17′	0·872	0	85	92	96				
4	"	9° 54′	0·872	0	85	92	96				
5	German.	9° 3′	0·910	4	50	64	74	79	82		
6	(?)	8° 15′									
7	English.	7° 58′		0	57	78	86	92	96		
8	American.	1° 44′	0·865	0	10	31	58	76	86	90	92
9	"	1° 20′		6	16	43	70	83	90		
10	German.	0° 58′	0·875	0	50	78	87	92	96		
11	"	0° 20′		0	48	72	82	92			
12	"	0° 18′	0·860	0	0	0	36	74	87	91	95
13	American.	0° 3′	0·860	0	0	0	40	78	91	96	

For convenience of comparison we have added the tests of four commercial turpentines. No. 5 is a terebene, slightly yellow, with smell of turpentine; above 183° this sample decomposed and left a thick resin.

No. 7, a very clear water-white article, smells of turpentine.

No. 13 was prepared by ourselves.

It will be seen by a careful inspection of the above table that the determination of the specific gravity and boiling points are of little value in estimating the purity of terebene. The smell also has no direct bearing on the purity, as the odor of turpentine is masked when mixed with its own weight of terebene. The only reliable determination of purity is the test with the polariscope together with the absence of fractions above 190° C.

If we take the mean rotation of commercial turpentines at 12°, then the samples Nos. 7 and 8 would contain respectively about 75, 65 and 15 per cent. of turpentine oil. No reliance, however, can be

placed on such calculations to determine the *exact* amount of turpentine oil contained in commercial articles, as the rotatiou of turpentine itself varies so greatly. It should not be supposed from the above that turpentine oil has been added as an adulterant, but merely that it has been insufficiently acted on by the acid. To reduce the rotation to about one degree the reaction may be conducted with comparative ease and large yields; but to remove the last traces great care must be observed, and at the same time the yield is very much reduced. Whether these articles are impure from a lack of knowledge or a desire to obtain larger yields it is difficult to say; yet surely some of the samples purchased by us in the open market are bad beyond reasonable limit.

CHEMICAL NOTES.

ABSTRACTS FROM THESES.

Bryony root.—Chas. F. Heller, Ph. G., made the following determinations with a specimen of the root containing 7.5 per cent. of moisture. It yielded 5.5 per cent. of ash, consisting of sulphate, chloride and carbonate of potassium, sodium, calcium, magnesium and aluminium. The benzol extract amounted to 0.746 per cent., and consisted of fixed oil, waxy substance and coloring matter. The alcoholic extract weighed 15.494 per cent., and from it the glucoside bryonin was prepared by the process of Walz. The aqueous extraction contained 9.360 per cent. of solid matter, consisting mainly of sugar, gum and albumen. On continued boiling with diluted sulphuric acid starch was the chief principle taken up, the extract weighing 49.024 per cent. Caustic soda now dissolved 6.1 per cent., and the residuary cellulose, after bleaching and drying, weighed 6.506 per cent.

The Ash of Pumpkin Seed, according to John G. Marbourg, Ph. G., amounts to 3.7 per cent. of the air-dry material. Water dissolved from the ash 57.03 per cent., diluted hydrchloric acid 39.59 per cent., and caustic soda 2.03 per cent., leaving 1.35 per cent. of insoluble residue. The ash consisted of carbonate, phosphate and chloride of potassium, sodium, calcium, magnesium and iron, and silica.

The seeds were found to be free from starch and yielded 35 per cent. of a reddish fixed oil extracted by benzol, and 3.05 per cent. of alcoholic extract.

Myrrh.—A sample of myrrh examined by Chas. E. Escott, Ph. G., treated with alcohol, left 56 per cent of insoluble matter. Maceration

with petroleum benzin yielded a pale yellow liquid, which on spontaneous evaporation left 18.75 per cent. of oily residue. Caustic potassa gave with myrrh a solution of a brilliant red color, turning to amber color on dilution. The gum left on treatment with alcohol had a barely perceptible odor of myrrh and a slightly mucilaginous taste, was neutral to test paper, and though of a pale color, gave with water a dark brown solution, the odor changing and becoming stronger, without apparent decomposition. The insoluble portion amounted to 15 per cent., or 8.4 per cent. of the weight of the myrrh. The dilute solution (1:450) acquired a purple color by ferric chloride, changed to reddish yellow by ammonia. Stronger solutions were precipitated by alcohol, not gelatinized by borax, and the precipitate with subacetate of lead was not redissolved. A castor-oil emulsion made with the gum, proved to be not permanent. The gum makes a good mucilage and should be saved for that purpose in making tincture of myrrh.

Damiana.—The leaves of Turnera aphrodisiaca, *Ward*, have been examined by F. W. Pantzer, Ph. G. The air-dry leaves lost in a drying chamber 11 per cent. of moisture and volatile oil, yielded 9.68 per cent. of ash. Petroleum benzin extracted 7 per cent. of volatile oil, fat, wax and resinous matter. Alcohol of 80 per cent. yielded 20 per cent. of dark green extract, containing tannin, two tasteless resins and extractive. Water dissolved 16 per cent. of mucilaginous and extractive principles, and by distillation with water ½ per cent. of an amber colored volatile oil was obtained, having a heavy aromatic odor and a warm camphoraceous and bitter taste. Alkaloids and glucosides were not observed.

Phytolacca.—Tannin was found by W. F. Wagner, Ph. G., in the berries, but not in the root. The active constituent was not isolated.

Assay of Cinchona Barks.—Clarence H. McCoy, Ph. G., has determined the amount of total alkaloids and of quinine in three samples of cinchona bark by the process of the U. S. P. Two of the samples were also analyzed by Dr. Squibb's process (Ephemeris, I. 105). The results were as follows:

	Total Alkaloids.		Quinine.	
	U. S. P.	Dr. S.	U. S. P.	Dr. S.
Cinch. succirubra,	5·385	5·58	1·265	2·16
Cinch. officinalis (Neilgherry)	9·79	9·82	1·93	2·24
Cinch. Calisaya (quill)	5·275	—	1·35	—

Castile Soap.—Four samples of white Castile soap, examined by H. C. Risher Ph. G., were free from animal fats and salts of metal.

Determinations of moisture and insoluble matters gave the following results:

1. Spanish	11·36	per cent.	moisture.	7·73	per cent.	insoluble in alcohol.	
2. Yanuti	14·94	"	"	1·72	"	"	"
3. Conti	10·99	"	"	3·55	"	"	"
4. Italian	10·66	"	"	2·89	"	"	"

The insoluble matter was almost completely soluble in distilled water.

GLEANINGS FROM FOREIGN JOURNALS.

By Geo. H. Ochse, Ph.G.

Arsenite of Strychnine is recommended by Roussell as a substitute for arsenical preparations, especially Fowler's solution. Fowler's solution has its disadvantages inasmuch as patients readily become accustomed to it, and when given in large doses it is apt to produce intoxication. When injected subcutaneously it does not possess the above mentioned disadvantages, but has little effect. Arsenite of strychnine injected hypodermically produces excellent results and is not painful. The dose to begin with should be small (0.001 gm). Arsenite of strychnine is a powerful antiseptic. In abdominal typhus it produces excellent results. Combined with salicylate of iron it is given in chronic anæmia, dyspepsia, etc.,—*Rundschau*, Prag, xii, page 855.

Parthenine (see Amer. Jour. Phar., 1886, p. 451) has a bitter taste. Given in doses of from 1 to 20 centigrams it aids digestion; in larger doses it slightly reduces the temperature of the blood, but has no effect on the secretion of urine.—*Ibid.*, xii, page 892.

Galazyne.—Dujardin-Beaumetz gives the following formula: Brewers yeast 4 grams, sugar 10 grams, cows' milk 1 liter. Dissolve the sugar and yeast in a little water, add to milk and keep securely corked in a cool place. The product contains from 1 to 2 per cent. of alcohol.—*Ibid.*, xii, 893.

Eau de Rabel.—Carles states that eau de Rabel has a more agreeable taste, is born better by the stomach and is a better solvent for quinine than dilute sulphuric acid. Eau de Rabel is simply Haller's acid (H_2SO_4 1, Alcohol 3) colored red with red poppy petals.—*Ibid.*, xii, 955.

Cocaine in croup.—Labrie praises cocaine as the best remedy for croup. He applies a brush dipped in a 5 per cent. solution of cocaine to the throat for several seconds, a few drops are allowed to go down

to the larynx. The operation is repeated 2 or 3 times a day and nothing but a little black coffee is administered to the patient.—*Ibid.*, xii, page 955.

Nubian blacking, which is considerably used in England, consists of 32 parts of blacking (made by dissolving 15 parts of aniline blue, and 15 parts of Bismarck brown in 800 parts of alcohol), 126 parts of alcohol, 11 parts camphor, 16 Venice turpentine and 36 parts of shellac.—*Ibid.*, xii, page 817.

Violet-phosphorescent sulphide of calcium.—In commerce there is found a durable violet-phosphorescent sulphide of calcium the preparation of which has been kept secret. According to analysis it consists of 37 per cent. sulphide of calcium, 50 per cent. lime, 7 per cent. sulphate of calcium, 5 per cent. of carbonate of calcium and traces of silicic acid, magnesia, phosphoric acid and alkalies. If prepared oyster shell is heated with sulphur in the same proportions as they exist in the " phosphorus of Canton " a product but slightly phosphorescent is obtained. The following formula is recommended as yielding the best product :—20 grams of lime prepared from the shells of hypopus vulgaris are finely powdered and intimately mixed with 6 grams of roll sulphur and 2 grams of starch. About 8 cc. of a solution prepared by mixing 100 cc. absolute alcohol, 0·5 grams subnitrate of bismuth and several drops of hydrochloric acid, are dropped on the mixture and the alcohol having been allowed to evaporate spontaneously, it is then heated in a crucible to bright cherry redness for twenty minutes. The crucible is allowed to cool off, the thin layer of calcium sulphate removed, and the contents of the crucible powdered and again heated for about half an hour. If the heat was not too intense the mass will be granular, breaking readily on slight pressure. When powdered again it loses considerable phosphoresence.—*Chemisch Technischer Centr. Anzeiger*, iv, page 845.

Bleaching Liquid.—The addition of a small quantity of glycerin to a bleaching mixture of chlorinated lime and soda makes the fabric whiter, does not affect the fibers, and does not require the use of acid to remove the chlorinated lime.—*Chem. Tech. Centr. Anzeiger*, iv, page 839.

Orcin—a new dermatological remedy—is a white, stable powder having a mild aromatic odor and a sweet, bitter taste, dissolves readily in the ordinary solvents and crystallizes easily from aqueous solutions. Orcin is a dihydroxyltoluol and is closely related to resorcin. It is prepared synthetically by fusing hydroxylate of potassium with chlo-

rocresylsulphonic acid. Like resorcin and ichthyol it is a keratoplastic remedy. In burns it eases pain quicker than resorcin or cocaine, and is worthy of further dermatological experiments.—*Rundschau*, Prag, xii, page 955.

Bark of Pomegranate Root.—By digesting 170 grams of pomegranate root bark with water slightly acidulated with acetic acid at a temperature of 70°C. for 12 hours and repeating the operation twice; then mixing the liquids, precipitating with acetate of lead, removing excess of lead with sulphuretted hydrogen and evaporating the filtrate below 60°C. to syrupy consistence, a liquid free from the astringent and disagreeable taste of the bark is obtained. The quantity mentioned above is for one dose.—*Phar. Zeit. für Russland*, xxv, page 707.

Luminous paper.—The following formula yields a paper which is impervious to water and luminous in the dark. Water 100 parts, paper 40, phosphorescent powder 10, gelatin 1, bichromate of potassium 1 part. The bichromate of potassium makes the paper impervious.—*Phar. Zeit. für Russl.*, xxv, page 712; see also Amer. Jour. Phar., 1886, p. 536.

PRACTICAL NOTES FROM VARIOUS SOURCES.

By the Editor.

Toothache Drops.—A solution is recommended in *L'Union médicale*, composed of camphor, balsam of Peru and alcoholic extract of opium, of each 1 gm., and mastic 2 gm. in chloroform 20 gm. A pellet of cotton moistened with this liquid is introduced into the cavity of the tooth.

Collodion of iodoform has been successfully used for the relief of neuralgia, and is usually prepared by dissolving 1 part of iodoform in 15 parts of collodion. Occasionally 10 per cent., and even 25 per cent. solutions have been employed.—*Nouv. Remèdes*, 1886, p. 525.

An older formula by James directs iodoform 5, balsam of Peru 5, powdered soap 5, and collodion 85 parts.

Preparation of pure Diastase.—C. J. Lintner recommends (*Jour. f. prakt. Chemie*, xxxiv, 378) digesting undried or air-dried malt with alcohol of 20 per cent., and precipitating the decanted solution with absolute alcohol. The pale yellowish floccules are repeatedly treated with absolute alcohol, then with ether, and are afterward dried *in vacuo* over sulphuric acid, when a light, yellowish-white powder

results. This is re-dissolved in water, precipitated by alcohol, macerated in alcohol, washed with ether and dried as before. It still retains about 10 per cent. of ash, mainly calcium phosphate, which, by dialysis, is reduced one-half. Its elementary composition, after deducting the inorganic constituents, was C 46.66, H 7.35, N 10.41, S 1.12. Diastase does not reduce Fehling's solution. · Its solution, on being evaporated, acquires a brown color, and, on boiling, separates floccules, which are soluble in caustic soda. With Millon's test liquid it gives the albumin reaction, and with Schönbein's reagent a transient, intensely blue color. This last test is best applied by dissolving a little guaiac resin in absolute alcohol and adding a few drops of commercial solution of hydrogen peroxide, followed by a drop of very dilute solution of diastase.

Bronzing of Metals.—Very handsome colors may be imparted to metals, according to *Metallarbeiter*, by the use of cold solutions of the sulphides of arsenic or antimony. The articles are thoroughly cleaned and dried; a thin layer of a dilute solution of polysulphide of ammonium is applied with a soft brush, allowed to dry, and after brushing off the separated sulphur, a dilute ammoniacal solution of sulphide of arsenic is applied. The color thus produced resembles that of mosaic gold, and becomes deeper and ultimately dark brown by repeating the application of the arsenic solution. A solution of sulphide of antimony produces a rose-colored tint, which may be deepened to dark red.

By polishing, the coating acquires a bright metallic lustre, and by the use of mordants the color is altered. Brass or bronze left for a long time in contact with the mordant becomes superficially greenish-gray, and quite glossy on being polished with cloth; if now treated with the above solutions a dull yellow color is produced.

The bronzing layer may be re-dissolved by ammonia or sulphide of ammonium, and the sulphides of antimony and arsenic may be dissolved in hydrate or sulphide of potassium or sodium.

GLEANINGS IN MATERIA MEDICA.

BY THE EDITOR.

Soluble starch has been observed by Dr. J. Dufour (*Jour. Roy. Micr. Soc.*, Oct. 1886, p. 819) in Saponaria officinalis, *Lin.*, in the epidermal cells of the leaves, stem and floral organs, with the exception

of the claws of the petals; and it has been detected also in a number of other plants, both monocotyledons and dicotyledons. It is soluble in water and alcohol, less soluble in absolute alcohol, and with difficulty only in ether, benzol and chloroform. It is rapidly extracted by acids and alkalies, crystallizes in yellowish sphæro-crystals and forms, with water, blue acicular crystals and an amorphous compound. This "soluble starch" is not a tannin as supposed by Kraus, nor an albuminoid as suggested by Nägeli; neither is it a carbohydrate analogous to ordinary starch.

Coniferin.—Hans Molisch (*Ber. D. Botan. Ges.* 1886, p. 301–305) recommends a reagent prepared by diluting a 20 per cent. thymol solution in absolute alcohol with water as long as it remains clear, adding excess of potassium chlorate, and filtering after several hours. On moistening lignified tissue with this liquid and then adding a drop of concentrated hydrochloric acid a blue-green color is produced in a few seconds even in the dark. In this respect it is preferable to Tiemann and Haarmann's reagent (1874) which succeeds best in direct sunlight, a yellowish-green, blue-green or sky-blue color being produced by phenol and hydrochloric acid.

The reaction is readily obtained with wood-pulp paper, and over one hundred herbaceous and woody plants which were tested, yielded the coloration, which appeared only in the lignified cells, notably in the cell-walls of the wood, then in the pith and bast cells. The coloration is not always alike in intensity which is doubtless due to the variable proportion of coniferin, and it is in some cases masked to a certain degree by the presence of phloroglucin, which with hydrochloric acid, is Wiesner's (1878) test for lignin, a reddish violet color being the result.

Pure coniferin gives only a faint reaction with the reagent. The cause of the intensity of the color in lignified tissue has not been determined. Vanillin always accompanies lignin; but Swedish filtering paper, soaked in a solution of coniferin and after drying, moistened with a solution of gum or of vanillin, yielded with the reagent no color or only a faint one. Tannin, oil of turpentine and fresh vegetable extract did likewise not further the reaction.

A blue color with coniferin, but likewise with vanillin, is also produced by *a* naphthol and hydrochloric acid.

The U. S. P. process for assaying opium has been studied by T. J. Wrampelmeier and G. Meinert, the results being communicated in a

paper read before the Michigan Pharmaceutical Association in October last. The results of the experiments lead to the following conclusions.

1. The increase in volume by solution of extractive matter is not sufficient to warrant us in taking 52 cc. of the filtrate as representing 5 gm. of opium (as had been recommended by Mr. Conroy in a paper read before the Liverpool Chemists' Association December 4, 1884). The volume directed by the U. S. P. (50 cc.) seems to be very nearly correct. At least it would require a large number of experiments to warrant us in changing that.

2. About 10 per cent. of the morphine in the opium is retained in the mother liquor after crystallizing the morphine according to the U. S. P.

3. Excess of either ammonium chloride or free ammonia increases the solubility of morphine in the mother liquor, and experiments should be made with a view to reducing the amounts of ammonium chloride and of lime.

4. The mixture of opium, lime, and water should *not* be allowed to stand in an open mortar, but might be made in a mortar if necessary and transferred to a stoppered flask or covered vessel of some kind to macerate.

5. The filtrate should *not* be measured in a bottle or flask, as directed by the U. S. P., but in a narrow graduated cylinder.

Pseudomorphine.—O. Hesse (Liebig's Annalen, vol. 235, p. 229) states that the oxydimorphine of Polstorff (*Berichte D. Chem. Ges.* 1880) is identical with pseudomorphine, and is formed in Keiffer's reaction (Annalen, 1859, vol. 103) by treating 1 molecule of morphine hydrochlorate in aqueous solution with 2 mol. potassium hydrate and adding 1 mol. potassium ferricyanide; pseudomorphine is at once precipitated, only a minute amount remaining dissolved in the mother-liquor. The total yield was 88·4 per cent.; theory requires 99·6 per cent. The oxidation takes place according to the equation:

$$2C_{17}H_{19}NO_3+O=C_{17}H_{18}NO_3.C_{17}H_{18}NO_3+H_2O$$

Morphine. Pseudomorphine.

In another paper (Annalen, vol. 234, p. 253) O. Hesse corrects some errors concerning the history of the alkaloid as published by Donath (*Jour. f. pr. Chem.* 2 ser., xxxiii, 559), and adds some reactions for

Distinguishing morphine and pseudomorphine.—Morphine dissolves

in pure sulphuric acid with a faint reddish color (not colorless), while the colorless solution of pseudomorphine becomes yellowish, then reddish. In the presence of a trace of ferric salt, the solution of morphine is reddish, that of pseudomorphine blue, turning deep violet and finally brown-green.

Mixed with an equal weight of cane sugar, morphine yields with sulphuric acid, either pure or in the presence of iron, a violet-red solution. Under the same condition pseudomorphine gives with pure sulphuric acid a deep green solution becoming brown-green; and in the presence of iron a beautiful blue solution, becoming dark green. On substituting milk-sugar or glucose for the cane-sugar, pseudomorphine gives with pure sulphuric acid a colorless solution turning slowly to greenish and bright blue-green; presence of ferric salt causes the color reactions to be more rapid and intense. These color reactions are characteristic for pseudomorphine.

Wistaria chinensis, Lin. A poisonous glucoside has been isolated from the bark of this ornamental climber by Ottow (*Nieuw Tijdschr.*, 1886, p. 207), and has been named *wistarin*. It is freely soluble in alcoholic liquids, sparingly soluble in ether, chloroform and cold water, is colored violet and green-brown by ferric chloride, and dissolves in alkalies and alkali carbonates with a yellow color, and in sulphuric acid with a yellow color changing to cherry red. Wistarin has a bitter and astringent taste, melts at 204° C., is not precipitated by tannin, yields a white precipitate with basic lead acetate and a green one with copper sulphate, and on being boiled with dilute sulphuric acid is decomposed into sugar, a crystalline resin and a volatile oil having the odor of menyanthol; this oil when treated with warm potassa solution is converted into a white compound of a coumarin-like odor.

The bark contains also a resin having apparently toxic properties.

Spiræa Filipendula, Lin., is a perennial herb the tuberous roots of which were formerly used in excessive secretion of mucous glands, and over fifty years ago were recommended in hydrophobia. Recently a Polish physician, Dr. F. I. Jagell, stated that he had successfully used the *bark* of this plant in the form of infusion, in 88 cases where persons had been bitten by rabid dogs or wolves, 26 of the patients having already exhibited the early symptoms of hydrophobia.

The root has not been fully analyzed, but is known to contain tannin, sugar and starch, and in the fresh state also a volatile oil, which is

probably identical with that of the stem and leaves, this consisting of salicylic aldehyde.

Boldoglucin. Dr. René Juranville has given in his graduation thesis the experiments and results with this glucoside, the preparation and properties of which were described in the AMER. JOUR. PHAR., 1884, p. 580. On account of its strong odor, boldoglucin cannot readily be given in the form of mixtures; but it was best administered to insane patients enclosed in gelatin capsules or by means of clysters. In doses of 1.5 to 4.0 gm. it produced a decided hypnotic effect, and occasionally cessation of the hallucinations; but these as well as sleeplessness returned on discontinuing the use of the remedy. Though it cannot supplant other reliable hypnotics, it appears to be useful in certain forms of insomnia.

Action of caffeine and theine. Léven in 1868, showed that theine produced convulsions in frogs, while caffeine did not; and that the lethal dose of theine was larger than that of caffeine. This is confirmed by the experiments on frogs, made by Dr. Thos. J. Mays, from which the following conclusions are drawn:

Theine and caffeine agree in the following—

1. They first affect the anterior extremities.
2. They diminish respiration.
3. They produce hyperæsthesia during the latter stage of the poisoning process.

They differ in the following—

1. Theine principally influences sensation, while caffeine does not.
2. Theine produces spontaneous spasms and convulsions, while caffeine does not.
3. Theine impairs the nasal reflex early in the poisoning process, while caffeine does not, if at all, until in the very last stage.
4. The lethal dose of theine is larger than that of caffeine.—*Therap. Gazette,* September '86.

China bicolor, Tecamez bark or Pitoya bark is stated by Vogl (1876) to be very similar in anatomical structure to cuprea bark. O. Hesse (Liebig's Annalen, vol. 234 p. 380) finds the bast cells of the former to be in groups of 8 or 10 cells (not arranged in densely packed rows), some of the cells being oval, lignified and with a small cavity, while others are polygonal and almost completely lignified. Its origin is uncertain; Karsten believed it to be derived from a Pinckneya. J. Hodgkin (Yearbook of Pharmacy, 1884 p. 545; see AMER. JOUR.

PHAR., 1884 p. 554), regards the plant to be a Remijia, and obtained from the bark 0.75 per cent. of alkaloids of which 0.255 was quinine, 0.06 cinchonine, 0.05 quinidine, the remainder being amorphous.

On analyzing the bark, Pelletier (*Jour. de Phar.*, October, 1825), found no quinine. Peretti (*Gazzetta Eclettica*, 1834–'35) reported the isolation of *pitoyine*, which was tasteless, but after combining with acids very bitter; above 100°C. fusible and partly sublimable in delicate prisms; the sulphate crystallized in white prisms, radiating in fan-like groups; the acetate was uncrystallizable. Hesse (Annalen, vol. 166, p. 235) showed that the bark contained no quinine or other alkaloid.

On repeating the examination with larger quantities (60 to 80 gm.) of the bark, Hesse (Ibid., vol. 234), obtained an alkaloid not exceeding 0.1 per cent.; it was absolutely free from cinchona alkaloids, but seems to be related to some of the alkaloids of Remijia Purdieana (see AMER. JOUR. PHAR., 1885, p. 199). It is soluble in ether, chloroform, and dilute sulphuric acid with an intense yellow color; the latter solution yields with a little ammonia or potassa a dark yellow precipitate, and dingy yellow precipitates with the chlorides of platinum and of gold, and with strong nitric acid; the solution was completely decolorized and deprived of alkaloid by treatment with a little animal charcoal. Hodgkin's results may probably be accounted for by the admixture of some bark of Remijia pedunculata.

Cinchol.—Accompanying kinovin Dr. Giesel observed a crystallizing compound which Liebermann named *oxychinoterpene* (*Berichte D. Chem. Ges.* 1884, p. 871), and which Hesse regarded as identical with his cinchol (see AM. JOUR. PHAR., 1885, p. 457). On re-examining the compound Liebermann (*Berichte*, 1885, p. 1803) found it to agree closely with Hesse's cinchol; but on account of slight differences, and because in some respects it resembles cholesterin, he preferred to name it *cholestol*. O. Hesse (Liebig's Annalen, vol. 234, p. 375) has shown that the needle-shaped scales of cinchol prepared from cinchocerotin, after fusion, will crystallize in broad laminæ, and that the compound from both sources may, therefore, be obtained in crystals resembling prisms or scales. The acetyl-cinchol prepared from the two bodies, crystallizes in prisms or after previous fusion, in scales; the melting point is 124°C.

Lactucerin was prepared by O. Hesse (Liebig's Annalen, vol. 234, p. 243) by treating German lactucariun with cold petroleum benzin

decanting and evaporating the clear liquid, heating the residue (lactucerin, resin and caoutchouc) in steam and extracting with boiling alcohol, the mother-liquor of which will finally retain the resin with some lactucerin. The crystals of the latter consist of two esters and yield, with warm, alcoholic potassa, potassium acetate and two alcohols, which after having been washed with water, are separated by boiling with little alcohol.

α lactucerol (formerly called lactuceryl alcohol) crystallizes in long, silky needles, is sparingly soluble in cold alcohol, acetone and glacial acetic acid, insoluble in water and alkalies, and freely soluble in chloroform, ether and ligroin, from which solvents it crystallizes anhydrous. It melts at 179°C., may be distilled in a current of carbonic acid gas, and has the composition $C_{18}H_{30}O+H_2O$. Its acetester is produced by continued heating with acetic anhydride, crystallizes in small scales, melts at 210°C., and is freely soluble in chloroform, ether, petroleum benzin, and in boiling alcohol and glacial acetic acid.

β lactucerol remains in the alcoholic mother-liquor of the *α* alcohol, crystallizes with difficulty, and on evaporation is obtained as a gelatinous mass, which on drying forms a white powder; from ether or chloroform it crystallizes readily in long needles of a silvery lustre, and isomeric with the preceding compound.

Lactucerin prepared as stated above, is a mixture of the two esters in varying proportion, and its melting point was found to vary between 182° and 207°C. Since, on heating, acetic acid is given off, it is possible that Lenoir's lactucon obtained in 1846, may mainly consist of lactucerin, which however has not all the properties attributed by Lenoir to his compound.

Lactucon obtained by Franchimont (*Berichte*, 1879, p. 10) from French lactucarium prepared from Lactuca altissima, is an indifferent compound, of the formula $C_{14}H_{24}O$, melting at 296°C. and was named *gallacton* by Hesse. A lactucon obtained by Flückiger (Pharmacographia, 2d edition, p. 398) had the composition $C_{19}H_{30}O$, and fused at 232°C.

Hesse observes that the lactucerols are isomeric with *sycocerol*, the acetester of which was found by Warren de la Rue and Hugo Müller (Annalen, vol. 116, p. 225) in the resin of Ficus rubiginosa, and possibly with *hydrocarotin* though he regards the latter as being $C_{20}H_{34}O$ and isomeric with cinchol. *Echicerin* is readily saponified by alcoholic potassa, but the alcohol which crystallizes in needles, differs from

lactucerol and from sycocerol. *Euphorbon* has an entirely different behavior, since it is resinified on being heated with alcoholic potassa, or with glacial acetic acid.

Orthosiphon stamineus, Bentham,s. Ocymum grandiflorum, *Blume*, is indigenous to India, Java and the Nicobar and Philippine Islands. The pale green leaves have purplish petioles and veins, and on both sides of the blade prominent oil glands. Dr. Van Itallie (*Phar. Zeitung*, 1886, p. 376) obtained from the dried leaves a small quantity of volatile oil and of a crystalline glucoside. This *orthosiphonin* has a bitter and afterward sweet taste, is freely soluble in absolute alcohol, less soluble in weak alcohol and in chloroform, almost insoluble in absolute ether, and is precipitated by plumbic subacetate, but not by the acetate or by tannin. It does not contain nitrogen.

THE HISTORY OF CALIFORNIAN BORAX.

By Arthur Robottom.

Sir Edward Bulwer Lytton, in the "Last days of Pompeii," bears testimony to the value set upon borax in the days of the Roman republic. "Borax," says Sir Edward, "was largely used by Nero and his slaves near 2000 years ago, and Pansa deeply regretted that he was not rich enough to buy borax to cover the arena after the death of the combatants at the time of the fight between Lydon and Tetraides." Many a time since my visit to the Californian borax districts has this passage sprung into my mind, and often I have thought what a pity it was that Olanthus, Glaucus, Caligula, and the gladiators did not know of the existence of the great borax lake in Slate Range Mountains, California.

My visit to this lake was one of the most interesting journeys I think I ever made in my life, and the accident of my making this journey arose in the following manner. In the year 1874 I visited the borax deposits in Nevada, and was on my way to San Francisco, when during the journey I was interviewed by a reporter of a Winnemucca newspaper, who, without my knowledge, sent on to San Francisco the following particulars concerning my visit in his paper, and which were duly reproduced before my arrival in the "Californian Alta," of San Francisco:—"Mr. Arthur Robottom, of Birmingham, paid our town a visit a few days ago, on a prospecting tour, to discover if any borate of soda or borate of lime exists in this section.

He was much struck with the number of hot springs that are to be found all through the Humboldt Valley. The borate of soda and borate of lime are known to exist at Hot Spring station on the Central Pacific Railroad, also at Columbus and other parts of this State; and no doubt if the hot springs of Humboldt Valley should prove to give off vapors that produce boracic acid, or that borate of soda is to be found in the alkaline beds which exist all over the district, a new and profitable trade will spring up. The article of borax has been well known all over the civilized world; still but very few people know of its origin. In 1818 Count Lardarel discovered how to prepare boracic acid from the Lagoons of Tuscany, and made a princely fortune by it. This boracic acid was shipped to England and France and converted into refined borax by boiling in large pans, and crystallizing in vats. Tincal was the article used in making borax before boracic acid was discovered. This article is found on the dreary plains of Thibet, in Asia, and sent on sheeps' backs across the Himalaya Mountains to Calcutta, and thence to England. About 20 years ago borate of lime was discovered in Chili, and found its way to England, Mr. Robottom being one of the first to introduce it into that country. Mr. Robottom will also visit the Hot Springs, Wadsworth, Columbus, and San Francisco." The result of this having appeared was that the morning after my arrival in San Francisco my hotel was fairly besieged with persons who were anxious to interview me in my capacity as a borax expert. After many interviews with individuals who professed to hold land said to be rich in borax, I decided to visit and inspect the great Slate Range district, and after making all my arrangements I left San Francisco, proceeding Southwards by steamer down the Pacific coast, and after a pleasant journey arrived at Los Angeles or City of Angels, an old Mexican town. Los Angeles is now, however, peopled principally with Americans, who drive a considerable trade with the teamsters who visit the interior. At this time the Southern Pacific Railway was not made, and this section of the country could be traversed only by the aid of mule teams; the Slate Range lay about 240 miles inland, and the whole country was infested with a band of ruffianly bandits and robbers, composed of the very refuse of society from all parts of California and Nevada. Under these circumstances I soon discovered that my only chance of travelling with any safety was to assume the role of what is known in this part of the world as a "busted" miner,

"busted" being a convertible term for ruined, and derived probably from "bursted," or broken up. I was also informed that on some parts of the journey, hay was worth £50 per ton, and water two shillings per bucket, and that it would be better for me to walk, and much safer. Adapting myself to the circumstances I started in my disguise and travelled with a mule team over a very rough country at the rate of from 12 to 14 miles per day, and arrived at length, without any remarkable adventure, at the shanty kept by Jim Bridger, some 42 miles from the Slate Range, and which is situated on the main road to Cerre Gorda, a wild looking spot, without any other road, the country being covered with the oleaginous plant known as greasewood, and the only animal life being represented by the dismal owl and the deadly rattlesnake! Not a very pleasant prospect, I thought, but I afterwards found when sleeping out in this part of the country that by surrounding myself with the ashes of a greasewood fire or a horsehair rope, that as far as the rattlesnakes were concerned there was no danger, as these reptiles, strangely enough, will never cross the ashes of a greasewood plant, or a rope made of horsehair. While as to the owl his existence was naturally a pure matter of indifference to me, so far as my comfort was concerned.

Rather a curious incident occured to me while staying at Jim Bridger's: a pioneer and prospector had come from the mountains to get a few supplies from the store, when he saw me sitting on a bench outside, and after a few words had passed, he remarked, "Why you are from the Old Country, and pretty green too! whatever brings you into a country like this? You are no miner! Have you been writing somebody's name on a bit of paper, or done some act as you're afraid of the Sheriff; or are you on the wrong side with the other sex?" My reply was that I was all right on these points, and had come out here prospecting for borax. He at once begged me to have nothing to do with it. He said, "There is plenty of it, but no one knows what it's good for." He had been down to Death Valley, and to the foot of the hills of the Slate Range, through Owen's Valley, and to Mono Lake, and he gave me much information about this "howling wilderness."

After a short stay at Jim Bridger's shanty I again proceeded, steering for the Foot Hills, some 22 miles from the shanty, then onward through a great cañon, or divide, partly covered with salt, on emerging from which I found myself on the border of the most important borax

lake yet discovered in the world. I was met by John and Dennis Searle, two men belonging to the California discovery army that sprang into existence in the year of 1849, and whose members are known by the name of "Forty Niner's." These men, masters of almost every kind of handicraft, had made their way to this great lake with a view of exploration. Consequently, though I can claim to be the first Englishman who visited the borax lake, the honor of discovery does not rest with me. I stayed some time in the hut of these men, and together we examined the ground. I very soon discovered natural borax of the finest quality in a pure state, and though Messrs. John and Dennis Searle had begun prior to my arrival to develop the ground, the first shipment was made by me to England The borax I found was crystallized borax, in the same form as the regular borax of commerce, and is the only known deposit of natural borax yet discovered in the world. In the centre of the lake is a bed of salt about five miles long; on the outside of this salt is a deposit of carbonate of soda, and some thousands of acres of land covered with crude borax, from three inches to two feet thick. The crude borax is collected and put into cowhide baskets, carried to a large boiling-pan, and boiled for 36 hours; the solution is then run into vats and the crystals form on the sides of the vats. After drying it is put into bags, about 70 lbs. in each bag, and sent to San Francisco, a distance of about 420 miles, and conveyed at that time by mule teams. Before leaving California I arranged to buy 1280 acres of this borax land; I returned to England as quickly as possible, made arrangements to go out again, formed a small company who put up works, and I anticipated making about a million by it, and before long we began to ship large supplies of borax to Liverpool, London, and New York. The price, however, suddenly came down to £26 per ton, the lowest price it had ever been sold for, while the carriage alone from the lake to San Francisco at this time was about £16 per ton of 2000 lbs. This was a paralzying condition of affairs that quite stunned me. I had made a very large contract for some hundreds of tons to a large firm in England, but before the arrival of the ship with the first parcel the firm failed, and I found myself, to my horror, with some hundreds of tons of borax left on my hands that I could not get rid of, the bankers and financial houses holding the documents all pressing for sales to be made! My golden dream of making a million faded away, and left me meditating the bitter realities

of impending ruin! (I yet anticipated that this property will at some future period be worth £1000 per acre. Experience has proved that the crude borate of soda on the surface of the land reproduces itself every three years.) As soon, however, as I had somewhat recovered from my shock I began to realize that I must do my utmost to find a market for the borax. I was driven to every move that a man could suggest to try and begin to get clear of the stock. I knew that if the public could only be made to understand the true merits of the article, and would begin to try it, all would come right for myself and friends. Consequently I set to work, and began to have the ground borax packed in penny packets. Here again I met with disappointment, for I soon found out that the public are very slow in taking to a new article, and I could not induce the retail shop-keepers to sell it. I offered it to the druggist, they all replied "you want us to sell far too much for a penny, we want eightpence for what you want a penny for; 25 per cent profits won't pay us." I then tried the grocers; they were satisfied with 25 per cent profit, or less, but their reply was characteristically disheartening. "It's all right," they said, "but borax is some kind of medicine, not a grocer's article, we can have nothing to do with it—it's too much trouble to tell the customers its merits." The whole business began to look very dark and gloomy; almost in despair I took a stand at the first dairy show in the Agricultural Hall, and met with marvellous success. I then tried many of the laundries in and about the suburbs of London, and I also tried many of the hospitals and other public places with more or less success.

A lady, universally known from her philanthrophy, sent her almoner to see me about it, and a specimen was sent by her desire to one of the first scientists of the day; but the true merits of borax were not then known even to the wisest of the wise. My belief in the borax, however, has never deserted me. I made many experiments and collected much information as to its uses, and the consumption during the last few years has very considerably increased; but this has only occurred since I parted with my interest to the Patent Borax Company of Birmingham, who have naturally been enabled to bring the product more forcibly to the front as one of the most useful and important products yet discovered in the world. I still feel a very keen interest in the future of this product, though I have no pecuniary end to serve in saying so; but the multiplicity of its uses

is truly marvellous, and the following information cannot, in my humble opinion, have too extended a circulation. For the laundry there is a very great deal of labor saved by using borax, as this product "softens" the dirt, and the latter may almost be said to float out of the linen, saving at once the destructive friction, and the time and materials. For the household its uses are legion; beds, &c., washed with a strong solution of borax in the spring, prevents insect life from forming; dusting the floors with dry borax destroys the larvæ of the moth, and keeps the carpets entirely free from insect life. For cleaning marble, plate, jewellery, decanters, plates; for improving the flavor of boiled vegetables, tea, &c., and preserving eggs, fish, butter, and milk, borax, in one or other preparations, is simply invaluable. It is the best tooth-wash known; will clean brushes, sponges, &c., from dirt. Medicinally the value of borax is not as fully known as it should be. I hold letters from eminent medical men who have corresponded with me upon its value, and who esteem it highly. The *Lancet*, of May 20th, 1876, contained a laudatory article on it as a valuable antiseptic "which does not irritate and inflame." I have cured thousands of persons suffering from sore throat, by giving them a small piece of borax to suck (I always carry a bit in my pocket wherever I go); and for dissolving the phlegm and clearing the throats of speakers, my own experience proves to me that it is the only reliable remedy.

Since the first publication of the above, extensive progress has been made in the development of the uses of borax by the general public; and from letters, the thanks and encouragement I am receiving from many friends and strangers satisfy me that I have given information which well repays me for all the trouble, losses, and the inconveniences I have been put to in trying to make this wonderful production better known.

Touching the labor uses of borax, it is mainly used in glazing all descriptions of porcelain, china-ware, pottery, &c. Blacksmiths use it for welding iron and steel. It is used for welding the seams of copper and iron tubes; in the manufacture of hats, jewellery, artificial diamonds, and the plates for affixing artificial teeth. The finest marble cement is made from borax. Farmers, graziers, &c., use it for washing cattle; and provision merchants for arresting or preventing decomposition in their hams, &c. The foregoing will, I trust, awaken people to an interest in this most valuable product of the earth.

Native Borax.—Analysis:—

Sodium biborate—pure	99.75
" chloride—trace only	0.25
	100.00

The following are the rates of wages paid for labor in this section:

	£	s.	d.	
Blacksmiths	1	0	10	per day.
" helpers	0	12	6	"
Engineers	0	16	8	"
Teamsters	0	13	6	"
Coopers	0	13	6	"
Boilerman	0	10	6	"
Watchman	0	10	6	"
Laborers, principally Chinamen	0	5	3	"

The Southern Pacific Railway Station is only about 72 miles from the lake, where the borax is carried by 20 mule teams, but in about three years or less a railway will run within four miles of this desolate country, when these wonderful natural deposits will be more carefully examined by scientific men.

Before concluding this article, I may here state that the borax lake is not a very enviable place to live in. On my first visit, Jim Bridger's shanty (42 miles from the lake) was the nearest place from which we could obtain our coffee, sugar, or canned fruits, &c., and post our letters. We had no drinkable water within 17 miles. Always a clear blue sky (a little London fog would have been a great treat). Not a tree visible; no vegetable, only the oleaginous greasewood plant. No animal life, no Indians, no clouds, no rain; and last, but not least, a total absence of the fair sex. The freight alone to build our works cost 2½d. per lb. from San Francisco.

107, Dunster House, Mincing Lane, London, E. C.

—*Chemical News*, Nov. 12, 1886, p. 245.

ASH OF CINCHONA BARK.

By David Hooper.

Government Quinologist.

I have recently been engaged in examining the inorganic constituents of cinchona bark, and the analysis has been communicated to the Government of Madras for information of the cinchona planters of the Presidency. As the chemistry of this drug will always be of interest to pharmacists, I send some notes relating to the amount of ash and the quality of the ash occurring in barks cultivated in India.

In Flückiger and Hanbury's *Pharmacographia* the following statement is made: "The cinchona barks yield but a scanty percentage of ash, not exceeding 3 per cent., a fact well according with the small amount they contain of oxalate and kinate of calcium."

With regard to the quantity of ash, my experience is that cultivated barks yield over 3 per cent.; the average of three hundred estimations made on samples from this country was calculated at 3.42 per cent. Renewed and old natural barks are the poorer in mineral constituents, but they never fall below 2 per cent. On the other hand, young and branch bark gives as much as 4 per cent., and it is interesting to notice that the leaves afford as much as 5, and sometimes 6 per cent. With regard to the species of cinchona, there is a marked difference in the amount of ash yielded by each, provided that natural bark is operated upon. The crown bark is richer in ash than that of the red, and the red richer than that of the Ledger; and knowing that crown bark grows at an elevation of 7,000 to 8,000 feet, the red at 5,000 to 6,000 feet, and the Ledger at 3,000 to 5,000 feet, the altitude may have something to do with this gradation of ash in the different species.

When gently incinerated at a low red heat cinchona bark should always leave a greyish-white ash. If it is at all reddish, it points to the presence of dust or dirt adhering mechanically to the sample; if weighed, it will be found much in excess of that obtained from clean bark. The two most dirty samples of bark I have met with came from Ceylon, leaving, when burnt, a reddish residue of 18.8 and 19.5 per cent. respectively, but as they were both labelled "dust," neither the vendor would be blamed for the impurity, nor could the purchaser rave on account of its poverty in alkaloids.

A complete analysis was made of the ashes of the two species of cinchona grown on the Nilgiris, the *C. officinalis* growing in the Dodabetta plantation, and the *C. succirubra* from the lower elevation at Naduvatam. Notwithstanding the barks were from different species and localities, the result of the examination shows that there is a great similarity in the composition of the ash.

	C. officinalis.	*C. succirubra.*
Soluble in water	27.33	24.46
Soluble in acid	66.92	69.94
Residue	5.75	5.60
	100.00	100.00

	C. officinalis.	*C. succirubra.*
Insoluble silica	5.75	5.60
Soluble silica	1.42	4.40
Alumina	2.70	4.24
Iron Oxide	2.85	3.21
Manganese	trace	—
Lime	32.70	32.80
Magnesia	2.07	2.52
Potash	16.35	12.49
Soda	3.40	2.28
Carbonic acid	27.22	27.77
Sulphuric acid	1.16	1.08
Phosphoric acid	3.93	3.19
Chlorine	.45	.42
	100.00	100.00

The chief constituent is the lime which forms nearly one-third of the whole, and exists in the ash in the form of carbonate. The next element of importance is the potash, which amounts to one-sixth and one-eighth of the whole ash respectively.

About fourteen years ago P. Carles wrote a paper on the "Complete Analysis of Cinchona Barks," in the *Répertoire de Pharmacie* (new series), vol. i., p. 60 (which appeared in the *Pharmaceutical Journal*, March 15, 1873), and a complete analysis is given of the ash of Huanuco, calisaya and succirubra barks from South America. His examinations agree on the whole with the above, but he finds traces of copper and appreciable quantities of manganese present. Although there was quartz present in most of my samples, weighed as insoluble silica, yet there was no trace of copper; and the absence of more than traces of manganese is in accordance with the nature of the Nilgiri soils. I am confirming Carles in showing what a small quantity of chlorine is present. As to bark rich in quinine associated with abundance of lime salts, I cannot agree that there is any relation between the alkaloids and the mineral elements. The cinchonas of South America were poorer in quinine then than the Indian barks are now, and they yielded about half the amount of ash. On the other hand the Ledger barks, which are richer in quinine than succirubras, always contain less ash, and consequently a less amount of lime. There is not much lime in the Nilgiri soil, yet it seems an essential ingredient in cinchona bark, and is taken up in large quantities, whether the cinchona is grown in India or America.

However different the soils of these two countries may be, a comparison of the analysis of Mr. Carles and myself will show that cinchona bark appropriated to itself a peculiar arrangement of chemical elements. If the arrangement of the inorganic constituents of plants were at all constant it would be a means whereby the chemist could assist the botanist in discriminating between different natural orders, genera, if not species of plants.—*Pharm. Jour. and Trans., Jan.* 8, 1887.

Ootacamund, India, Dec. 7, 1886.

ACORIN AND ITS DERIVATIVES.

By H. Thoms.

The bitter principle of the rhizome of *Acorus Calamus*, L., was first investigated by Faust (*Arch. Pharm.*, 1867, 132, 214), who obtained a soft resin-like bitter principle of the color of refined honey, to which he gave the name of *acorin*, and concluded from its reactions that it was a nitrogenous glucoside.

Hopff has shown that both vegetable and animal charcoal have the property of extracting the bitter principles from numerous bitter plants. The author employed freshly ignited bone charcoal to extract the principle from the aqueous solution. After two days' digestion of the charcoal, with frequent shaking, the bitterness of the liquid had disappeared. The charcoal was collected on a filter, well washed, dried, extracted with 90 per cent. alcohol, and the filtrate distilled until a turbid aqueous solution remained. The last fraction of ethereal oils can be removed on the water-bath. On treating with ether and evaporating, a honey-yellow balsam is obtained with a faint aromatic odor and a strong, bitter, aromatic taste. The process yielded about 0·18 per cent. of acorin. The product thus obtained was found to be free from nitrogen, the nitrogen in Faust's product being due to the presence of impurity.

Acorin is insoluble in water, dilute acids, and alkalis, easily soluble in absolute alcohol, methyl alcohol, ether, benzene, toluene, chloroform, carbon bisulphide, and acetone. By long heating with dilute acids or alkalis, an odor of ethereal oil becomes clearly perceptible. Fehling's

solution gives a faint sugar reaction. Attempts to obtain acorin in a crystalline form were unsuccessful. Heated to 85°, the color darkens perceptibly. A considerable quantity was heated for several hours at 80°, and with this the subsequent investigation was conducted.

Analysis gave the formula $C_6H_{10}O$. The molecular formula of acorin was deduced from the amount of sugar obtained by the action of dilute acids and alkalis respectively. Discordant results were obtained, owing to the oxidizing effect of the atmosphere, but the results became concordant when the reaction was conducted in hydrogen. The reaction is represented by the equation $6C_6H_{10}O=3C_{10}H_{16}+C_6H_{12}O_6$; hence the molecular formula of acorin is $C_{30}H_{60}O_6$. Decomposition under the action of emulsin gave concordant results, whilst yeast and saliva failed to cause the formation of sugar, and superheated steam did not complete the decomposition. The ethereal oil formed during the above decomposition was produced in quantity by the action of aqueous soda in a current of hydrogen. After fractionating, the oil boiled at 158—159° C, and had the composition $C_{10}H_{16}$. It has an odor of turpentine, is colorless, soluble in alcohol and ether, and has a sp. gr. of 0·8793 at 0°. A portion boiling at 250—255° had a bluish color, which disappeared on boiling with metallic sodium, still the hydrocarbon, which now boiled at 255—288°, had the same composition, $C_{10}H_{16}$. It was sparingly soluble in alcohol, readily in ether.

Acoretin, $C_{35}H_{58}O_7$, the resin resulting from the action of dilute acids or alkalis on acorin, is a dark brown, gritty, bitter, viscid body, with a faintly aromatic odor and neutral reaction. It is easily soluble in alcohol, ether, chloroform, and acetone, insoluble in benzene. From its solvents, it separates in an amorphous state on evaporation. An attempt to induce further oxidation by heating with strong hydrochloric acid was unsuccessful. Acoretin was not reduced to acorin by the action of zinc and hydrochloric acid, but metallic sodium in the presence of water induced the reduction, as shown by the change in color and odor of calamus. The resin extracted directly from calamus rhizome, when purified, was found to have the same composition as acoretin.

The author discovered in the calamus rhizome a crystalline alkaloïd *calamine*, of strongly basic nature; it contains nitrogen.—*Jour. Chem. Soc.* 1886, p. 895. *Arch. Phar.* 1886, 465-481.

THE TESTING OF BALSAMS, RESINS AND GUM RESINS.

Dieterich and, more recently, A. Kremel have attempted to extend the Köttstorfer method of examining fats and oils to the testing of substances included in the groups of balsams, resins and gum resins. The leading idea in Köttstorfer's method, it will be remembered, is that in fats and oils, besides free fat acids, there are present glycerin ethers of fat acids. By titration it is ascertained how much potassium hydrate is required by a unit of the fat or oil to combine with the free acid, and, further, how much is used up in the saponification of the glycerin ether. The former quantity is distinguished as the acid number, the latter as the ether number, and the sum of the two as the saponification number. Quite similar data are yielded by balsams, resins and gum resins, as all these substances contain free acids mixed with varieties of ethers.

The determination of these bodies may, therefore, be carried out in a manner quite analogous to the Köttstorfer method. About one gm. of the substance to be examined is dissolved in alcohol free from acid reaction, some drops of phenolphthalein added and then titrated with half-normal potash solution until there is a permanent red coloration. The quantity of caustic potash used for one gm. of the substance is taken in milligrams, and this is called the acid number. In those substances where ether is present in addition to acid, a definite portion of the liquid is heated with excess of half-normal potash solution, and then titrated back with hydrochloric acid. The quantity of alkali used is calculated to one gm. of the substance, and the number of the milligrams similarly taken as the ether number. The sum of the two gives the saponification number.

In the examination of substances not completely soluble in alcohol they are dissolved with the aid of ether-alcohol or ether-chloroform. Gum resins are first exhausted in a Soxhlet apparatus with alcohol, and the alcoholic extract, after drying and weighing, is estimated; the numbers obtained are not calculated in respect to the whole of the substance originally taken, but only for the quantity of resin soluble in alcohol. In the determination of light-colored substances the use of phenolphthalein presents no difficulty; with dark-colored substances, such as Peru balsam, guaiacum resin, etc., the difficulty is overcome by adding water to the alcoholic solution up to the point of milky turbidity, and then dropping in alternately potash solution,

and, after shaking, phenolphthalein, the end reaction being easily recognized by the formation of a red ring upon the surface of the milky liquid. In some cases (copal and sandarac) there is a formation of precipitate after the addition of potash solution, due to the potassium salts of the particular resin acids being difficultly soluble in alcohol; when this occurs the addition of water will redissolve the precipitate.

The following table, giving the results of the examination of different balsams, shows that a conclusion could be very well drawn from numbers obtained as to the nature of a sample. For instance, an addition of gurjun balsam to copaiba balsam would very considerably lower the acid number of the latter.

Balsams.	1 gm. substance—mg. KOH.		
	Acid No.	Ether No.	Saponif. No.
Balsamum Canadense	83	—	—
" "	81·3	—	—
" Copaivæ Maracaibo	73–75	—	—
" " "	76	—	—
" Cop. Mar. from Capaifera nitida	78·7	—	—
" Copaivæ Maturin	77·1	—	—
" " Para	29·6	—	—
" " " (?)	78·2	—	—
" Dipterocarpi (Gurjun Bals.)	20·0	—	—
" " " "	19·3	—	—
" " " "	14·2	—	—
" " " "	5·8	—	—
" Mecca	45·1	—	—
" "	51·8	—	—
" Peruvianum	40·4	189·8	230·2
" "	40·8	199·2	240·0
" "	49·4	181·1	230·5
" " fr. Myroxylon Peruiferum	36·7	104·9	141·6
" Tolu	127·2	26·7	153·9
" "	100·6	58·7	159·3
Terebinthin. comm	128·7	—	—
" "	124·4	—	—
" Venet	68·4	—	—
" "	70·3	—	—
" Chia	47·8	—	—
" "	53·4	—	—
Styrax liquid	47·6	31·9	79·5
" Alcohol. depur	61·0	76·0	137.0

The important kinds of resins are also distinguishable from one another by considerable differences in the figures, as will be seen from the following table:

Resins.	1 gr. substance—mg. KHO.		
	Acid No.	Ether No.	Saponif No.
Benzoin, Siam	141·4	55·4	196·5
" Penang	122·2	57·0	179·2
" Sumatra	96.0	60·9	156·9
Colophonium, light	163·2	—	—
" dark	151·1	—	—
" americ..	173·0	—	—
" anglic	169·1	—	—
Copal	132·0	—	—
" afric	147·3	—	—
" indic	140·2	—	—
" brasil	127·4	—	—
" fr. Guibourtia copalifera	128·9	—	—
" Zanzibar	85·3	—	—
" "	80·0	—	—
Damar	31·0	—	—
"	34·3	—	—
" from Damara orient	34·2	—	—
" blanc from Vateria indica	15·4	—	—
Elemi, Manilla	3·0	24·2	27·2
"	17·6	7·8	25·4
Euphorbium	13·4	64·6	78·0
Guiacum	23·28	—	—
"	44·0	—	—
Jalap in	14·7	172·9	187·6
Jalap resin	12·9	119·8	132·7
" "	12·1	120·7	132·8
Lacca in granis (alc. depur.)	—	—	174·8
Shellac, white	73·7	102·8	176·5
" yellow	65·5	50·2	115·7
Mastic	61·8	—	—
"	90·9	—	—
Pix burgund	142·2	—	—
Resina Pini	77·8	—	—
" " (alcoh. dep.)	102·6	—	—
Sandarac	144·2	—	—
Scammonium e radice	14·6	171·0	185·6
" Aleppo	8·2	172·0	180·2
Succinum	34·4	74·5	108·9
"	33·4	91·1	124·5

With gum resins the indications are not so useful:

Gum resins.	Per cent. of resin	gm. resin—mg. KHO.		
		Acid No.	Ether No.	Saponif No.
Ammoniacum, afric	77·6	59.0	123·0	182·0
" persic.	67·7	112·0	30·6	142·6
" "	67·1	110·0	50·0	160 0
" "	70·7	100·0	50·6	150·6

Gum resins.	Per cent. of resin	gm. resin—mg. KHO.		
		Acid No.	Ether No.	Saponif No.
Asafœtida	72·1	26·8	145·2	172·0
"	35·6	54·8	182·1	236·9
Bdellium	48·6	26·0	34·7	60·7
Galbanum	74·3	28·3	119·3	147·6
"	74·2	28·0	132·2	160·2
Gamboge	79·6	100·0	56·7	156·7
Myrrha indica	30·7	42·1	130·8	172·9
Myrrha	39·5	64·0	95·0	159·0
"	—	60·2	116·5	176·7
"	—	70·3	145·8	216·1
Olibanum	—	59·3	6·6	65·9
"	72·1	46·8	41·0	87·8
" indicum	67·0	50·3	60·5	110·8

The titration of a gum resin is best effected by mixing one gm. of the substance with some indifferent body (powdered gypsum by preference) and extracting it with 95 per cent. alcohol. The residue from evaporation of the alcoholic extract, which gives the percentage of resin, is then redissolved in 50 cc. of alcohol; half of the solution is used in the acid determination and the remainder in the ether determination, the quantity of potash used being calculated to the gm. of pure resin. The numbers obtained with gum resins were not very concordant, whilst the differences between the different kinds are not so great with the resins. At present, therefore, it seems that titration will only have a limited application to the determination of gum resins. —*Phar. Jour. and Trans.*, Jan. 8. 1887. *Phar. Zeit.*, 1886, p. 477.

THE AMOUNT OF CAFFEINE IN VARIOUS KINDS OF COFFEE.

By Dr. B. H. Paul and A. J. Cownley.

Having recently had occasion to determine the amount of caffeine in several samples of coffee, for the purpose of comparison, it became necessary in the first place to make some experiments in order to ascertain what method could be relied upon for furnishing uniform and constant results. By extracting the beans with boiling water, completely precipitating the clear liquid with subacetate of lead, then removing any excess of lead from the filtrate and evaporating to a small bulk the caffeine may be obtained in a crystalline condition; but it is

still very impure, and the recrystallization, after pressing between bibulous paper, so readily gives rise to loss that this method cannot be relied upon to give accurate results. It is, moreover, extremely tedious and troublesome. Dr. James Bell[1] recommends as a better method the extraction of coffee beans mixed with magnesia by boiling with strong alcohol, evaporating off the spirit and treating the residue with water to dissolve the caffeine. In this way a considerable portion of the coloring material is separated by the magnesia, and a further quantity is got rid of by evaporating the aqueous solution to dryness with a further quantity of magnesia, and then dissolving the caffeine in hot benzol. We have not, however, found this method to give more satisfactory results than the previous one, and one circumstance that greatly interferes with its application to coffee is the considerable amount of fat present in the bean. After several attempts to modify these methods of treatment for the determination of caffeine in coffee beans we had recourse to the use of lime as a means of separating the tannic acid while dissolving out the caffeine by boiling with alcohol. For this purpose it is advisable to mix the finely powdered coffee with moist lime and then to extract the mixture in a continuous percolator of the kind described by Waitt in this Journal (vol. xiv., p. 376). The alcohol is then evaporated off and the dry residue is mixed with some water and a few drops of dilute sulphuric acid, the addition of which has the effect of separating the fat and clarifying the solution by converting a small quantity of soluble lime salt into calcium sulphate. After filtering the cooled liquid it is quite free from fat, and may then be evaporated to obtain the caffeine in a crystalline state. A better plan, however, is to extract the caffeine from the solution by shaking it with chloroform, in which it is freely enough soluble to be readily taken up, and on evaporating off the chloroform caffeine will be obtained in a condition fit for weighing. The principal points to be observed in carrying out this operation are the acidification of the water solution from the spirit extract and the shaking with chloroform, but with proper care very uniform results can thus be obtained. We have hitherto been in the habit of operating upon 50 grams of coffee beans in each experiment, but after confidence in the method has been obtained and experience in operating, a much smaller quantity might be taken.

On applying this method to the determination of caffeine in various

[1] 'Analysis and Adulteration of Foods.' Part I, p. 16.

samples of coffee we were at first somewhat perplexed by the great discrepancy of the published statements as to the amount of this constituent that is present, as will be seen from the following quotations:

	Caffeine in raw coffee beans per cent.
Robiquet	0·32 to 0·64
Liebig	0·23 to 0 46
Zenneck	0·75
Graham, Campbell and Stenhouse	0·88 to 1·00
Dragendorff	0·99 to 1·22
Squibb	1·00 to 1·03
Bell	1·08 to 1·11
Allen	0.50 to 2·00

The discrepancy between the data given as applying to roasted coffee is still greater, and in the *Allgemeine Kaffee Zeitung* for 1884 the amount of caffeine in roasted coffee is stated to range from 2·00 to 3·64 per cent.

The first result with which we were struck on carrying out a number of experiments with several different samples of raw coffee beans was the very narrow range within which the amount of caffeine appeared to vary. Instead of being a varying amount, it was more nearly a constant quantity in those kinds of coffee beans we had an opportunity of examining, which were the following:

	Caffeine per cent.
Coorg	1·10
Guatemala	1·18
Travancore	1·16
Liberian	1·20
"	1·28

In making these determinations the raw coffee berries were not dried, but taken just as they came to hand and powdered. A difference in the amount of water might therefore have altered the amount of caffeine in the dry material, but there is not much reason for expecting that the foregoing data would have thus been materially affected. It would be desirable to extend these determinations of caffeine to a number of other samples of coffee from various sources, and it is to a great extent with the hope of obtaining samples for examination that we now make known the results that have been so far arrived at. In a future communication we propose to deal with the determination of some of the other constituents of coffee.

The above determinations were all made with unroasted coffee, and it may be added that in experiments with roasted coffee we found a similar uniformity in the results obtained, so that a determination of the amount of this constituent may probably furnish a means of detecting the adulteration that is now so largely practiced in the sale of ground coffee according to the custom that is general in this country. It has been stated that in the ordinary roasting of coffee the caffeine is to a great extent volatilized and lost. We have strong reason for believing that this statement is entirely incorrect, for in a number of experiments made by roasting coffee beans in which the amount of caffeine had been previously determined in the raw state we ascertained that there was an increase in the amount of caffeine in the roasted coffee and that this increase was uniformly proportionate to the loss of weight experienced by the coffee in roasting. As a general rule the amount of caffeine in pure roasted coffee is about 1·3 per cent. This may be more or less to some slight extent, according as the coffee is slightly or highly roasted, but there did not appear to be any evidence of the volatilization of caffeine during roasting.—*Phar. Jour. & Trans.*, Jan. 15, 1887, p. 565.

NOTES ON THE PHARMACY OF CHIAN TURPENTINE.

By Henry Campbell.

Pharmaceutical Chemist.

Attention has again been drawn to this drug by the recent publication of cases of cancer treated with it; and inquiries having been made as to the best mode of dispensing it, I beg to submit a detailed description of the method I have for some years followed (under direction of Professor Clay) in preparing an emulsion of the drug.

It will be remembered that Chian turpentine is an oleo-resin from the trunk of *Pistachia Terebinthus.*

It has no bitter taste whatever, but has a pleasant smell, which is intensified by boiling with sulphuric acid and solution of potassium bichromate, and then somewhat resembles the odor of oil of lemon.

The turpentine is received in two forms; either containing a variable (and sometimes large) quantity of sand, bits of bark, etc., or purified from these by heating with water and straining. When so

purified it has an opaque appearance very different from that described in the text-books; and, in my opinion, is likely to be injured by such treatment.

It has been exhibited in the form of pills and of an emulsion. The finely divided state in which it exists in the emulsion renders it more likely to be absorbed (when swallowed) than if it is given in the pilular form.

The emulsion should contain an invariable proportion of the purified oleo-resin, and must be freed from the ether used in the process.

To do this I prepare an ethereal tincture, ascertain the strength of it, convert it into an emulsion, and expose in an open vessel, with frequent stirring, until all ether has gone off.

To make the ethereal tincture:

Put any convenient quantity of the turpentine into a wide-mouthed bottle, with an equal bulk of ether, cork tightly and shake frequently until all soluble matter has dissolved, set aside until the ethereal liquid has become bright, decant it, and evaporate half a fluidounce in a tarred evaporating dish—at first in a current of air—finally exposing to a very gentle heat for a minute or two (the heat of warm water is sufficient if the dish be rotated).

When the ether has gone off weigh the dish and its contents, deduct the weight of the former and thus ascertain the quantity of pure oleo-resin in each half-ounce of tincture.

The standardized tincture may of course be kept for any length of time, and the emulsion made from it as required.

To prepare the emulsion:

Place in a large mortar 240 grains of pulverized acacia and 50 grains of pulverized tragacanth, add as much ethereal solution as contains 240 grains of the turpentine, mix, and add all at once a fluidounce of water, triturate until an emulsion is formed, then dilute gradually to eight fluidounces. Two fluid drachms will contain seven and a half grains of the pure drug, the usual initial dose.

Remove all traces of ether by exposure with frequent stirring in an open vessel, preferably in the cold.

The removal of all ether is important, because the dose of emulsion is gradually increased, and the treatment continued for a considerable time.—*Phar. Journ. and Trans. Dec.* 4, 1886.

Queen's Hospital, Birmingham.

NOTE ON TINCTURE OF STROPHANTHUS.*

By W. Martindale.

The researches of Drs. Fraser and Ringer on strophanthus, the kombé arrow poison, and the publication by the former of his paper, read at the Cardiff Meeting of the British Medical Association (*Brit. Med. Journ.*, vol. ii., 1885, p. 904), have lately attracted much attention to this drug. Unfortunately a supply of it is difficult to obtain. A paper on the species of strophanthus used in medicine was read at the Evening Meeting here on March 10, 1886, by Mr. Holmes (*Pharm. Journ.*, 1886, p. 778, Am. Jour. Phar. 1886, 406). Since then a supply of the drug has been received by Messrs. Christy & Co., and a formula for the tincture has been published by Messrs. Burroughs, Wellcome & Co. (*Pharm. Journ.*, 1886, p. 304, A. J. P. 1886, 405), on the authority of Dr. Fraser. It directs that 1 ounce of the seeds, first deprived of their oil or fat by means of ether, is to be percolated with rectified spirit to produce 8 fluidounces of tincture. As pharmacists have looked with some suspicion on the employment of ether for the extraction of the fixed oils from such drugs before making pharmaceutical preparations of them, for example in the present process for making extract of stramonium and in the now discarded process for making liquid extract of ergot, I therefore wrote to Dr. Fraser pointing this out, stating my fear that some of the activity of the strophanthus seeds might be removed by the ether, and mentioning also that as there was a tendency to decimal proportions for these preparations, I thought that a 1 in 10 tincture would be preferable. I concluded by saying that I should be glad to have a reply from him in corroboration or otherwise of the formula published by the above-mentioned firm. He replies:—

"The active principle of strophanthus is practically insoluble in ether, and therefore it is quite a suitable solvent for the oil whose presence is objectionable in the tincture.

"I have used a tincture of various strengths. Seeds alone without hairs 1 in 8 of rectified spirit was adopted because of its being the strength of tinct. of digitalis, and the dose of such a tincture is 2 to 4 minims.

"As this dose is inconveniently small, especially for children, I now generally use a tincture of half the strength, 1 in 16.

*Read at an Evening Meeting of the Pharmaceutical Society of Great Britain, Wednesday, November 17.

"One in 10 would not get over this difficulty. The dose of the tincture of 1 in 16 would, of course, be 4 to 8 minims.

"I have not seen the letter of Burroughs & Wellcome to which you refer."

He further writes:—

"Although the pods contain active principle, the relation of a tincture obtained from them to a tincture from the seeds has not been determined. The two should not therefore be used together. The preparation I have used in therapeutic work has always been the tincture from the seeds. I do not know what the dose would be of a tincture from the combined pods and seeds. I think also the seeds freed from their comose appendices should alone be used. In reference to the preliminary extraction with the ether, it is obvious the ether should be washed to remove spirit."

This is so far conclusive, and as the results of other therapeutic observers will have to be compared with Dr. Fraser's, when tincture of strophanthus is ordered pharmacists must supply the tincture of the seeds only, deprived of oil. Still, as the drug is scarce and costly it is well that we should examine it and try to utilize all the parts of it that possess activity. While awaiting Dr. Fraser's reply I prepared a little tincture of the bruised natural seeds by percolating one part with rectified spirit *q. s.* to produce 8 fluid parts. It is labelled *a*, is of a yellowish-green color and has a characteristic bitter taste. I did not examine the marc of this to notice if it was exhausted.

Nearly one-half the weight of the pods now offered for sale consists of the linings of the pericarps, one-third (nearly) is seeds, and about one-fifth is hairs.

In preparing Dr. Fraser's tincture, the seeds in coarse powder were percolated with about five times their weight of ether, specific gravity 0.720 (the rectified washed methylated). A deep emerald-green liquid having a claret-colored fluorescence was obtained. It has deposited a small quantity of crystalline sediment. Evaporation of a part of it shows that the seeds yield 27 per cent. of dark green ethereal oil or oily extract, which is very bitter in taste, and only slightly soluble in rectified spirit. After the ether was evaporated from the marc this was again slowly percolated with rectified spirit, 1 to produce 8 parts of yellowish-green colored tincture marked *b* 1, but this is much paler than tincture *a*. Percolation was continued fraction-

ally to produce a second 1 in 8 percolate, marked *b* 2, and a third, 1 in 4, marked *b* 3; the last two percolates are practically colorless, but bitter, and although their specific gravity is the same as the spirit used in making them, yet the marc is still bitter. The specific gravity of the first percolate is nine points higher. Mixed, these three percolates would produce a 1 in 20 tincture.

The depurated tincture *b* 1, on addition to water, of course forms a clear mixture; but tincture *a* only causes a slight opacity when it is mixed with water—very little more than the same quantity of tincture of orange peel would cause.

I also percolated a separate tincture of the powdered pericarp lining, 1 in 8 with rectified spirit, marked *d*. It is pale greenish-yellow in color, has the same but less bitter taste than the tincture *b* 1, and is five points lower in specific gravity. The marc left was still bitter. I likewise prepared a tincture of the hairs 1 in 8, with rectified spirit, marked *c*. It has the yellowish-green color of tincture *a*, and has a similar bitter taste, although according to Messrs. Hardy & Gallois (*Pharm. Jour.*, 1877, p. 756; *Am. Jour. Ph.*, 1877, p. 402) the hairs only contain ineine, a crystalline principle which has not the same physiological action as strophanthin contained in the seeds; this stops the heart's action when its solution is injected into a frog, which ineine does not.

I give these results of my experiments, expecting to elicit expression of opinion as to what formula might eventually be adopted. The present one, Dr. Fraser himself acknowledges, produces a preparation too concentrated for practical use. As the drug arrives with a variable amount of the pericarp adhering, and this generally in bad condition, and as the hairs are said to possess different properties to the seeds, I think the seeds alone should still be used, as they only can be relied upon to produce an uniform tincture. The other portions possessing activity might be economized for preparing the active principle. Care must be taken in handling the drug and its preparations, as they act as topical irritants, to the mucous membrane particularly.

Since writing the above Dr. Ringer has kindly tried the ethereal oil on frogs for me and finds that although not inert it does not possess much activity, not nearly so much as a 1 per cent. solution of the arrow poison.

Mr. T. R. Bradford, of University College, to whom I gave samples, also writes:—

"I have performed some experiments with the tinctures of the seeds, pods, and hairs, and I find them all active; but that obtained from the hairs is the weakest, and that from the seeds is the strongest in arresting the movements of the frog heart. They are also all of them powerful muscle poisons, particularly the pod tincture, but of course to decide this more experiments would be necessary."—*Phar. Jour. and Trans.*, Nov. 20, 1886, p. 411.

VARIETIES.

AGARICUS ALBUS has been successfully used by Dr. A. Peter (*Med. News*) for relieving the sweating of consumptives. Ten grains given at bed time had a cathartic effect; but given in five grain doses no such effect was observed, and in about a week all sweating ceased. When a return of the night sweats is threatened relief is again afforded by the remedy, which has no effect upon the cough.

AGARIC ACID in doses of $\frac{1}{12}$ to $\frac{1}{8}$ grain has been similarly employed.

QUININE RASH.—Dr. M. A. Veeder, of Lyons, N. Y., observed a case of quinine rash in which the condition of the skin closely resembled that existing in scarlatina. The patient had been taking quinine in small doses for some slight disorder, supposed to be malarial; but, becoming alarmed, medical advice was sought, and the taking of quinine was forbidden. The rash disappeared promptly, but returned again when, as an experiment, quinine was administered in small doses.—*N. Y. Med. Record.*

HYDROGEN DIOXIDE IN CATARRHAL AFFECTIONS.—Dr. John N. Mackenzie directs attention to the use of hydrogen dioxide in four-per-cent. solution for catarrhal affections attended by profuse muco-purulent discharge, used in doses of a fourth to half an ounce three, four, or even six times a day; for topical use he prefers a six-per-cent. solution. By some persons even weaker solutions cannot be used, on account of their irritating effect upon the air-passages. A marked improvement in the gastric functions was incidentally observed during its administration. Indeed, so striking has been its effects in this regard that it is worthy of more extended trial in obstinate stomachic derangement.—*Phil. Med. Times*, Jan. 8, 1887, p. 268.

CHARCOAL AND CAMPHOR.—A mixture of equal parts of camphor and animal charcoal is recommended by Barbocci for preventing the offensive odor and removing the pain of old excavated ulcers. The camphor is stated, to act as a disinfectant, and the charcoal absorbs the offensive odors.—*British Med. Jour.*

SOLARINE.—Dr. Geneuil (*Bull. gén. Ther.*) has given the hydrochlorate in doses of one half a grain, repeated three or four times a day, in cases of neuralgia, rheumatism, obstinate vomiting, spasmodic nervous affections, asthma, and bronchitis, and believes that the remedy will prove to be of great value in the treatment of these and similar affections. The following are his conclusions: (1) Solanine is a poison to the terminal motor plates. It narcotizes the medulla and spinal cord, causing a paralysis of the terminal, sensory, and motor

nerves. By reason of this action solanine is to be classed among the best of the analgelsics. (2) The drug may be prescribed in large doses without danger, and presents none of the inconveniences of morphine or atropine. There is no danger of a cumulative action. (3) Solanine does not cause congestion of the brain, even in the aged, and, probably, a like freedom from this danger exists in the case of children. (4) In all cases where it is necessary to calm excitement, relieve pain, or overcome spasm, solanine promises excellent results. It may be given with advantage in the place of morphine for the relief of any of these conditions.—*Med. Record.*

PHARMACY IN INDIA.

Read before the Alumni Association of the Philadelphia College of Pharmacy, January 18st.

LAHORE, INDIA, November 27, 1886.

The subject "Pharmacy in India" is probably one which has not been brought before you, and for this reason I am induced to address you, trusting the characteristics of Indian pharmacy will make up any lack of composition by the writer. In the first place there is no pharmacy law in the country, and any one can engage in the drug business regardless of his knowledge of chemistry. Hence, there are all sorts and conditions of chemist shops from the strictly legitimate shops of Calcutta and Bombay to the native medical halls in the bazaars, where poisons of all sorts are as freely sold as Epsom salts. In Calcutta and Bombay the drug stores are on a line with the pavement as at home, but in other cities and stations of India they, as well as all stores, are built in the centre of yards, or, as called here, compounds to which there is an entrance and exit gate. The buildings are all one story with very high ceilings, large airy rooms, the store portion to the front and residence part in the rear. Over the entrance to the store a portico is built on account of the great heat of the sun, which would be felt severely by some persons even in the short space of time occupied by leaving the carriage and entering the store. Around the portico are potted plants, rose bushes, etc., and the entrance is, as a rule, bordered with potted plants. Hence, we have no window display, and the part of an apprentice's life, the flies in the window, is unknown here. Outside of Calcutta and Bombay, there are no strictly chemist businesses; but this is an adjunct to a general store, and as a rule is the best paying branch of the business. The chemistry part of the business takes the lead in the firm's advertisements, as Root & Co., chemists and general merchants, and this is carried out by merchants whose stock in trade consists of a few auction patent medicines.

The British Pharmacopœia is the standard, but many Indian medicines are prescribed, and there is an Indian Pharmacopœia which is unofficial. Many American preparations are used and the United States Pharmacopœia is to be found in every drug store. American patent medicines have a very large sale, and among the non-secret preparations Parke, Davis & Co.'s Fluid Extracts and McKesson & Robbins' Capsuled Pills have become best known. The quantity of McKesson & Robbins' Quinine Capsules that are sold is marvellous. Of course this is a country of fevers and malaria, and the perfection

which these capsules have reached have impressed themselves on the medical men, and the natives are among the most frequent buyers. To sell them in bottles of one hundred is of very frequent occurrence. The patent medicine trade is large, but it is much hampered by the natives who sell at prices that Europeans cannot touch. Most of the goods of the former are auction goods, such as have been on the shelf until the wrappers become unsightly and are then handed over to the auctioneer. Then the native bears the same relation to the European as the Chinaman to the American; he can live on such a small amount that the profit on one bottle of medicine would keep him in food several days.

Connected with all chemist shops (the term for drug stores) is a manufactory for aërated waters, the sale of which is enormous. Aërated water (carbonic acid water), soda water (with a tinge of bicarbonate of soda), lemonade, gingerade, tonic water (with a trace of quinine), and potash water are those principally bottled. Soda water is kept in bottles of 14 ounces capacity, and the sweetened waters in 12 ounce bottles. The water in India is very bad and many persons never drink anything but aërated waters; but what causes the greatest consumption of soda water in India is the "Peg." This is a drink of whisky or brandy mixed with a bottle of soda water, and ninety-nine one hundredths of the liquor is drank in this way. Whisky is never drank "neat;" but although it is well watered, I doubt if there is a place in the world where the consumption of liquors will average that drank by the European population in India.

The term European applies to all foreigners in India who are of white skin. The aërated water trade is being much cut into by the regimental messes who are large consumers. They buy a machine, manufacture their own waters and sell them to customers at greatly reduced prices. A petition has gone up to the Viceroy from the tradespeople, protesting against the soldiers competing with them in this way. Natives do all the work, prepare the syrup, and bottle the waters.

A feature of the drug business is that no small quantities are sold as a general rule. Most things are put up in bottles and the customer must take a bottle or none. If he asks for an ounce of chlorate of potash lozenges, he is told they are only kept in bottles, one rupee each, a four ounce bottle containing about three ounces of lozenges for forty cents. Vaseline, lime water, ipecac wine, spirit of nitre, etc., are all kept in bottles, and it is very seldom any one inquires for half an ounce or one ounce, and sends a bottle for it. Many things that are sold several times daily in all shops at home, rarely find a sale here. Senna, salt, magnesia and paregoric are sold once a week probably.

The prescription trade is large and profitable, there being a fixed price which is adhered to by most Europeans. There are many native chemist shops which advertise the compounding of prescriptions, but many who deal exclusively with them for other things, send their prescriptions to European chemists.

There are a great many native doctors who have a diploma from some Indian native university, who can speak and write English, and have considerable practice. Then there are the apothecaries, who are employed by the government in every station to take charge of the station dispensary and practice

among the government clerks, such service being given to them free, while the apothecary draws an income also from the tradespeople, many of whom employ him. The European doctors are all army surgeons who are appointed civil surgeons in the different European stations. Besides drawing his army pay he enjoys a large income from his practice. A civil surgeon serves three years in one station and is then transferred to another. From these different practitioners there comes a large prescription business and sale of surgical appliances, etc.

Few customers appear at the store and then only when it is necessary to select, or when buying fancy goods, etc. A greater part of the trade is done by chits (notes sent by servants), and nine-tenths of the business is credit. Such a country for credit does not exist in another place and there is not a firm that does not carry a large amount of bad debts on its books. People seldom carry money with them and credit is refused only to those who are known as "bad hats."

Now, as to the preparation of prescriptions. In Bengal and the Punjab the eastern and northern portion of India, the European assistant copies the prescription in the book, and at the same time calls out the ingredients to a native, who is called a compounder. He has served a sort of an apprenticeship in some dispensary, then has some experience in a drug store and there develops into a compounder. He seldom speaks English, but, as a rule, can make out the names of the ingredients and quantities, but can seldom read directions. He places all his bottles on the counter and then prepares the prescription while the European gives him the quantities. Unless the prescription requires some special manipulation, he manages to compound it all right; but otherwise it is necessary to stand by him and tell him what to do. They do everything, prepare plasters, suppositories, etc., make all the preparations for the shelves, but everything must be checked. After the prescription is compounded, he calls out the quantities and has his bottles in order as they appear in the prescription. Often he has gotten hold of the wrong bottle and the preparation is useless, and all it concerns is an ejaculation and it passes out of his mind the next minute. It would be impossible for Europeans to do the work, the heat is so great and working away at a batch of pills would cause a profuse perspiration in two minutes. There is a native for everything and on account of the caste institution of India one man will not do the work of another. There is one man whose special duty is washing bottles, etc., another acts as an apprentice to the compounder who shoves the hard work on him, such as working pill masses, pounding roots, etc., and so firm set are they in their feeling of respect for those above them they dare not rebel.

Bills are all collected by natives called chupprassees, and are sent out at the beginning of each month. There is a system of checking by which the bills can be traced daily to each chupprassee; and should any money be missing or not be turned in, and some customer declared he paid, the chupprassee to whom the bill was delivered on the day of payment can be traced at once. But there is little stealing this way and natives are trusted with large amounts in their possession.

But nine-tenths of them steal, though in small amounts, and while your man would not steal a hundred dollars from you he would not scruple to steal a two cent piece. It is necessary to keep all the show cases locked day and

night, and when serving a customer, you are compelled to unlock a case before you can get at the goods. Quinine and expensive chemicals are also under lock and key. The natives in the government dispensaries stole so much quinine that, to protect itself, the government have all their quinine colored pink, which effectually prevents any one from disposing of it. As for lying, they are professionals, from the compounder to the lowest menial, and they can hatch up a lie in a twinkling. There is a man (Chowkedar), who sleeps on the verandah at night to receive any chits that may come and also to guard the place.

In the Bombay Presidency the European clerk has a still better time of it as Portugese compounders are mostly employed, and they write their own labels, copy the prescriptions and do not require checking. But what is most to be commended in the business in India are the hours. Here in Lahore we open at eight o'clock and close at six. One hour is allowed for breakfast, one for dinner or lunch, and a cup of tea is brought into the shop about four o'clock; close on Saturday afternoon at two, and never open at night or on Sunday. In Simla, in the Himalayas, where I served two years, in winter we opened at nine and closed at five in the afternoon.

It is a poor place to apprentice a white boy. From his earliest days all his work is done by natives, and when he comes into a shop he thinks he is being made a menial if called upon to do anything servants could do. So he gets no practical experience in the rudiments, learns the business in a superficial way and would not be fit, when three years in the business, to take the place of a six months' apprentice at home. But don't let any one who hears these lines come to India on a speculation. In the first place the climate is against you. Should you be on a Plains' station during the summer you must be under a Punkha—a large fan, which swings backward and forward above your head, creating a breeze—all day and all night. One is over your head in the dispensary, another in the shop proper, one over your dining table, and one over your bed, and this last is the one which causes one to forget the commandments if anything in the world does. You go to sleep with the punkha coolie giving you a fine breeze. After an hour he falls asleep and you awake in a profuse perspiration and with a muttered ejaculation shy a boot at his head, which effectually wakens him for another hour. And thus goes on the night and the poor punkha coolie in the morning is only too glad to get away and soothe his bruises.

It is difficult to get a situation. I came to India knowing nothing whatever of the country nor anybody in it. I found but three chemist shops in Calcutta employing Europeans, and this is the largest city in India. Then I received the awful information that every chemist brought his assistant (drug clerk) out from England on an agreement, passage paid out and back, and the clerk to stop with his employer three, four or five years as the case may be. In three weeks I was fortunate enough to secure a vacancy, but I might have been six months without even hearing of one. For a clerk to leave at the end of his agreement long notice must be given, allowing his employer ample time to bring out another man from England. Lastly your salary varies, a very distressing fact. The rupee, the coin used in India—silver—fluctuates. When I came to India it was worth one shilling and eight pence—40 cents; then it went down to 1.6, then to less than 1.4 (32 cents), and now it is at one and six

pence; it should be two shillings (50 cents) when at par, and I trust that when I leave the country it may be at a favorable rate of exchange to somewhat compensate me for the heat and fevers that I have endured since entering the country.

I trust these lines may have proved of interest to you, and that it may not be many days before I can be present at one of your social gatherings.

JOHN A. FALCK.

MINUTES OF THE PHARMACEUTICAL MEETING.

PHILADELPHIA, January 18th, 1887.

The fourth of the present series of pharmaceutical meetings was held this day, Mr. Wm. B. Webb being called to preside. The minutes of the last meeting were read, and there being no corrections required, they were approved.

Donations to the library and cabinet being in order, the actuary presented the fourth edition of the National Dispensatory from Prof. Maisch; Buffon's work on oviparous quadrupeds and serpents, in four volumes; and from Dr. Andrews, through Dr. A. W. Miller, a copy of "House-plants as Sanitary Agents." On motion, a vote of thanks was directed to be returned to the donors by the actuary.

Professor Trimble presented to the cabinet a remarkably fine specimen of *Thymol*, which Mr. Jenks had given him for that purpose. It had deposited from a five-pint bottle of oil of horsemint that had been standing for a long time undisturbed.

Mr. Webb, who was absent from the last meeting, remarked that he observed upon the reading of the minutes that *oil of camphor* is largely imported, but a use for it was not stated. This oil is largely used as a rubefacient in veterinary practice, one dealer who supplied some large stables with it buying it in quantities of 500 pounds at a time.

Professor Trimble read a paper on *Terebene*, by Dr. H. W. Jayne and Mr. G. H. Chase, which was listened to with a great deal of interest. There has been considerable interest manifested in terebene as a remedy in pulmonary affections, and it has been used considerably by several physicians who make throat and lung diseases their specialty. The paper was illustrated by a table, to which Professor Trimble called attention, showing that the variations in specific gravity did not indicate in any wise the purity of the preparation; this is indicated only by its being devoid of any rotary power in the polariscope. On motion, a vote of thanks was ordered to be returned to Dr. Jayne and Mr. Chase for their interesting and valuable paper. The paper was referred to the publishing committee.

Dr. Miller exhibited a specimen of a bark which Dr. McCollin, Demonstrator of Pharmacy in the Jefferson Medical College, received from a student of that College, a Chinaman. The peculiarity is that the bark when broken transversely shows a layer of silky fibers which still hold the two pieces together. Another specimen exhibited was the fruit of a plant said to furnish a variety of tapioca.

Professor Remington exhibited two balances of the variety known as *torsion balances*. They depend upon the tension of a wire which has been strained

with some sixteen pounds of weight; by recent improvements steel wire has been substituted for a gold one. This, and shortening the bridges, give a steadiness which former ones were very deficient in. In answer to an inquiry, Prof. Remington stated that the balances, when loaded with an ounce in each pan, were sensitive to a milligramme. There being no further business, on motion adjourned.

T. S. WIEGAND.

REVIEWS AND BIBLIOGRAPHICAL NOTICES.

The National Dispensatory, containing the natural history, chemistry, pharmacy, actions and use of medicines; including those recognized in the Pharmacopœias of the United States, Great Britain and Germany, with numerous references to the French Codex. By Alfred Stillé, M. D., LL. D., etc., and John M. Maisch, Phar. D., etc. Fourth edition. Philadelphia: Henry C. Lea's Son & Co., 1886. Large 8vo, pp. 1781. Price, cloth, $7.25; leather, $8; half Russia, $9.

The previous editions of the above work have been fully commented upon in this Journal for the years 1879 and 1884. Near the close of 1885 the new British Pharmacopœia made its appearance, which differs in many important and numerous minor points from the previous edition of that Pharmacopœia in 1867. These differences may be briefly summarized as follows: The pharmacopœial names of about two hundred drugs and preparations have been changed; twenty-two drugs and preparations have been dropped; about one hundred and sixteen new ones have been added, and the composition of a large number of preparations has been more or less altered. All the references throughout the Dispensatory, bearing upon the British Pharmacopœia have been carefully revised so as to correspond with the present requirements of that authority.

A large number of remedial agents have attracted more or less attention during the past two or three years. Some of these promise to be of permanent value. Of the more important new remedies, which were not, or but briefly mentioned in the third edition, the following are now more fully noticed: antipyrina, cocainæ hydrochloras, fabiana, franciscea, gymnocladus, hydroquinonum, hypnonum, iodolum, jacaranda, lanolinum, menthol, phormium, sulphophenolum, thallinæ sulphas and urethanum. Iodol (page 1660), is not an addition product, but a substitution compound of pyrrol, having the formula C_4HNI_4.

It will be seen from the foregoing that the present edition of the work before us includes besides the unofficinal articles, and those of the United States Pharmacopœia, likewise those of the latest issues of the three principal pharmacopœias of Europe, namely Great Britain, France and Germany.

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The Pharmaceutical Era, a monthly exponent of pharmacology in all its departments, including Chemistry, Microscopy, Botany and the art of Pharmacy. A. B. Lyons, M. D., editor. Published by D. O. Haynes & Co., Detroit, Mich. Price, $1.50.

With the beginning of 1887 the appearance of a new journal under the above title is announced, under the editorial management of Dr. Lyons, who will doubtless keep it abreast of the best interests of American pharmacy and

pharmacy in general, and with this view has our best wishes for substantial success. When the publisher's announcement states the belief "that the field of pharmaceutical journalism is not yet fully occupied," this was probably intended for cutting sarcasm; for which other civilized nation on the face of the globe can boast of so many "pharmaceutical journals" in proportion to the inhabitants, Indians included?

The above was written for our January number, but with other matters was crowded out. The first number of the new journal has in the meantime made its appearance and fully sustains the expectations expressed above.

An Ephemeris of Materia Medica, Pharmacy, Therapeutics and collateral information. By Edward R. Squibb, M. D., Edward H. Squibb, S. B., M. D., and Chas. F. Squibb, A. B. Brooklyn, N. Y.

A year ago we announced with regret the discontinuance of this excellent publication, but expressed the hope that this might be only temporary. We are pleased to announce now that the first number of the third volume has been published in January, and that Dr. Squibb intends to continue to prepare material for publication as time and circumstances may permit, and whenever such may be in readiness, to offer it in this form, even if that should only be once or twice in a year.

Sixième Congrès International Pharmaceutique,, tenu à Bruxelles du 31 Août au 6 Septembre, 1885. Compte rendu par E. Van de Vyvère, Secrétaire-général. Bruxelles: Henry Lamertin, 1886. 8vo., pp. 1244.

Sixth International Pharmaceutical Congress, held in Brussels, from August 31 to September 6, 1885. Report by E Van de Vyvere, general secretary.

This voluminous report, which was published in Europe last summer, has at last reached the United States. The volume is handsomely printed and contains a full account of the work done by the Congress, including all the reports, papers read, discussions, etc. It is printed in the French language with the exception of the draft of an International Pharmacopœia which is in Latin, while the prefatory and explanatory notice has been written by Mr. von Waldheim in both the German and French languages. An account of the Proceedings will be found in the October number of this Journal, 1885, p. 525.

Proceedings of the Eighth Annual Meeting of the Missouri State Pharmaceutical Association, held in Sweet Springs, Brownsville, June, 1886. St. Louis: 8vo, pp. 115.

An account of this meeting will be found on page 360 of July number, 1886.

Chemical Lecture Notes, taken from Prof. C. O. Curtman's lectures at the St. Louis College of Pharmacy. By H. M. Whelpley, Ph. G., etc. St. Louis: published by the author. pp. 143. Price, $1.

This little volume serves a good and useful purpose as brief notes of the salient facts, connected with chemical physics and with the chemistry of non-metallic elements, and which are well adapted for reference by students studying the branches.

Principles of General Pharmacy, with special references to systems of weights and measures, specific gravity and its uses, pharmaceutical manipulations; pursuant to a course of Adolphus Fennel, Professor, etc.; compiled by Ch. T. P. Fennel, Ph. G., Professor of Practical Pharmacy and Instructor in the Pharmaceutical Laboratory in the Cincinnati College of Pharmacy. Cincinnati: McDonald & Eick, 1886. 8vo, pp. 124.

This is an outline of a course of lectures on pharmacy, commencing with an explanation of prescriptions, and then treating of weights and measures in their various relations; after a definition of the various physical forces the different pharmaceutical manipulations are considered, and, finally, the different classes of pharmaceutical preparations. The little work is well adapted as a note book on such a course of lectures.

Gmelin-Kraut's Handbuch der Chemie. Anorganische Chemie. Sechste umgearbeitete Auflage. Zweiter Band, erste Abtheilung. Heidelberg: Carl Winter's Universitätsbuchhandlung. 1886.

Gmelin-Kraut's Handbook of Chemistry. Anorganic chemistry. Sixth edition, rewritten. Price of each number 1½ Mark.

We are much pleased to announce that after a lapse of several years the first part of the second volume has been completed, forming with the table of contents, a stately volume of 960 pages. We have previously stated that the work is issued in numbers, sixteen of which were necessary for the present one containing the metals of the alkalies, alkaline earths and earths. The last three numbers are devoted to the compounds of silicium, including most of the minerals of which this element forms an intrinsic constituent, and to the chemistry of glass. The last eleven pages contain corrections and additions to the preceding pages of the volume.

This comprehensive work in its latest edition is now completed with the exeption of the chemistry of arsenic, antimony, tellurium and bismuth. The first volume, published in two parts, contains chemical physics (886 pages) and non-metallic elements (580 pages); and the third volume (1376 pages) the chemistry of the heavy metals. Of the second part of the second volume, eight numbers (528 pages) have appeared, bringing this portion nearly to the end of the manganium compounds. The revision of this part has been undertaken by Prof. Jörgensen of the Polytechnikum in Copenhagen, and it is to be hoped that the manuscript may be sufficiently advanced to enable the publishers to lay this grand work, completed, into the hands of chemists without great delay.

Ueber Wirkung, therapeutischen Werth und Gebrauch des neuen Karlsbader Quellsalzes nebst dessen Beziehung zum Karlsbader Thermalwasser. Von Dr. W. Jaworski, Universitäts-Dozenten in Krakau. Selbstverlag des Verfassers. Large 4°, pp. 33.

On the action, therapeutic value and use of the new Karlsbad spring salt, and its relation to the Karlsbad thermal water. Published by the author, Prof. Dr. W. Jaworski of Cracow, Austria.

The pamphlet is a reprint from the *Wiener Medizinische Wochenschrift*, 1886, and is mainly devoted to experimental investigations made in the clinic

of Prof. Korczynski in Cracow, with the view of determining the effect of the salt, under various conditions, upon the stools and upon the functions of the stomach, with the clinical deductions based upon the previous observations. The proper application of this salt is then discussed; it is compared in composition and effect with the natural spring-water, and the manner is shown in which the use of the two may be advantageously combined.

The process for preparing this new Karlsbad spring salt was elaborated by Professors Ludwig and Mauthner in 1880, and is now conducted under the supervision of Dr. Sipöcz in the manner briefly described in AMER. JOURN. PHAR. 1882, p. 408. The sprudel-water is boiled, the precipitate (consisting of silica, alumina, and the carbonates of calcium, magnesium, iron and manganium) is filtered off, the filtrate evaporated, and the saline residue, still containing several per cent. of water, is saturated with carbonic acid gas derived from the spring. The average composition, which is stated to vary not over two per cent. for the principal constituents, is as follows: sodium sulphate 43·25, sodium hydrocarbonate 36·29, sodium chloride 16·81, potassium sulphate 3·06, lithium hydrocarbonate 0·39, sodium fluoride 0·09, sodium borate 0·07, silicic anhydride 0·03, ferric oxide 0·01 (see also AMER. JOUR. PHAR. 1882, p. 408; 1883, p. 130).

American Medical Plants, an illustrated and descriptive guide to American plants. By C. F. Millspaugh, M. D. New York and Philadelphia: Boericke & Tafel, Fascicle V (Nos. 21 to 25). Price $5.

The indigenous North American plants described in this fascicle are Aesculus glabra, Ambrosia artemisiæfolia, Argemone mexicana, Arisæma Dracontium, Collinsonia canadensis, Chamælirium luteum, Euphorbia hypericifolia, Helianthemum canadense, Humulus Lupulus, Hydrophyllum virginicum, Lachnanthes tinctoria, Lactuca canadensis, Leptandra virginica, Lilium superbum, Lycopus virginicus, Penthorum sedoides, Ptelea trifoliata, Polygonum acre and Ranunculus sceleratus. The following plants are naturalized, adventive or cultivated: Anagallis arvensis, Artemisia Absinthium, Artem. vulgaris, Chenopodium anthelminticum, Convolvulus arvensis, Euphorbia Lathyris, Hypericum perforatum, Phaseolus vulgaris, Salix purpurea, Sinapis alba and Solanum nigrum. The plates are well executed, and the characters of the plants are usually fully indicated; of Chenopodium and perhaps of one or two other plants, a more characteristic figure would have been acceptable.

Of the more important inaccuracies in the text the following deserve to be mentioned: Oleum hyperici is not a constituent of St. John's wort, but an oleoinfusion colored red by the coloring matter probably contained in the black dots. The root of Artemisia vulgaris has been repeatedly analyzed since 1826; but a new analysis is desirable. Thridace is not lactucarium, but is an extract obtained by expressing cultivated lettuce. Although we have shown, twenty years ago, that an efficient lactucarium may be prepared from Lactuca canadensis, and W. Hiland Flowers in 1879 proved this to have the same constituents as European lactucarium, we are not aware that the American plant is utilized for preparing lactucarium.

The Blue and Gold Handbook of the University of California. W. J. Baktnett, 1887, General Manager, San Francisco; Pavot, Upham & Co., 8°, pp. 124.

The pamphlet contains historical sketches of the University and its professors, descriptions of its museum, library, art gallery and observatory, and reports of the schools of law, medicine, dentistry and pharmacy, the latter being the California College of Pharmacy.

Journal and Programme of the Chicago Drug Clerks Association for 1887, 8vo.

Mutual improvement, fostering amicable relations with the employers, shortening the excessive hours of labor, and social intercourse appear to be the main objects of the Association.

Proceedings of the American Pharmaceutical Association at the thirty-fourth annual meeting held at Providence R. I., September 1886; also the Constitution, By-laws and Roll of its members. Philadelphia. Published by the American Pharmaceutical Association, 1886. 8vo., pp. 773.

The present volume was sent out January 14 and 15, within two weeks of the time fixed by resolution of the Association. It opens with the reports of standing committees, followed by the papers, presented to and read at the meeting; the minutes of the several sessions; the preliminary draft of a national formulary of unofficinal preparations; the report on the progress of pharmacy during the past year, and the usual appendix, containing various lists, the constitution and by-laws, roll of members and index. The preliminary matter contains the preface, table of contents, list of queries and the lists of officers and authorized agents. The list of officers since the organization in 1852 has been rearranged and now gives also date and place of each annual meeting. A phototype of the late Professor Edward S. Wayne accompanies the volume, and it is stated that he inaugurated the reading of scientific papers before this Association in 1855, by presenting an essay on the growth and production of wines in the West, and on Catawba brandy and tartar.

Non-members may obtain bound copies of the volume from the Permanent Secretary, at $6, which includes postage.